ELECTRICAL TIMES

THURSDAY
20 JULY
1950
SIXPENCE

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Ferranti Instruments, Meters, Transformers and Power Factor Correction Condensers installed in a Sub-station of an Engineering Works
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FERRANTI LTD., Hollinwood, LANCS.
London Office: Kern House, Kingsway, W.C.2
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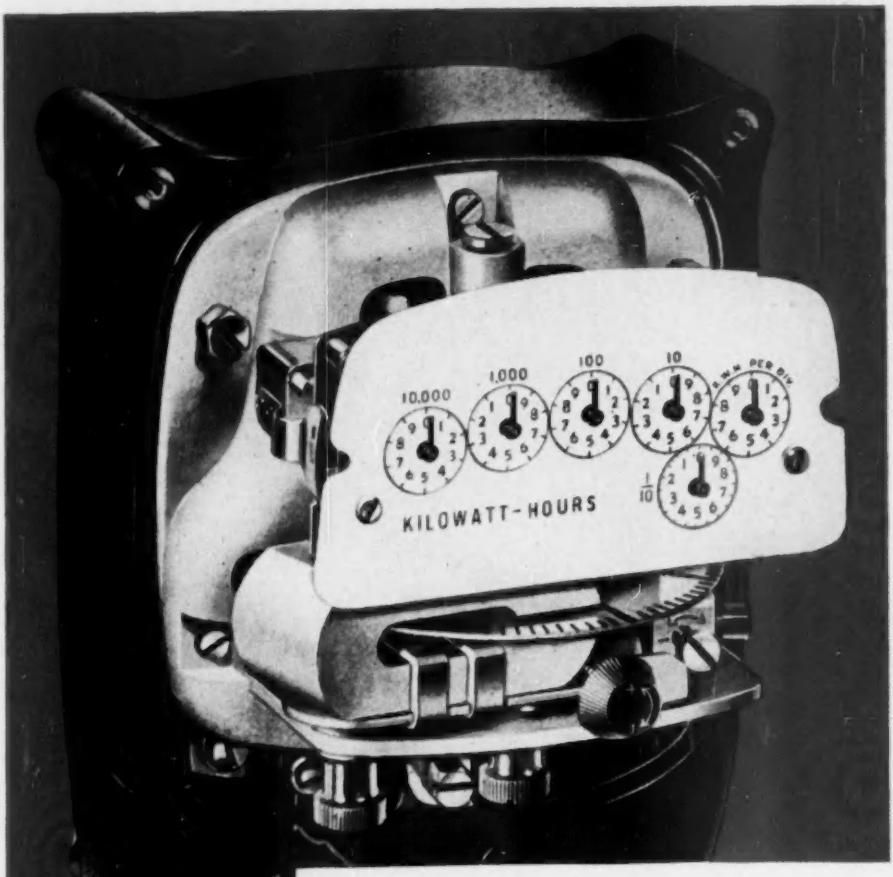

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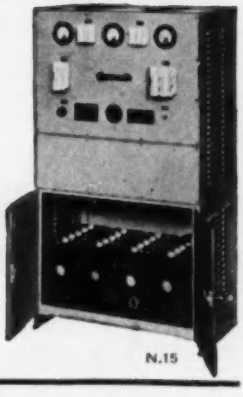
CROMPTON PARKINSON, LTD., (PLANT DIV.)
CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2.

AS DEPENDABLE AS DAYBREAK

When you have a Nife-Neverfayle emergency lighting equipment you need never fear a sudden disastrous black-out. For the NIFE battery is absolutely dependable. However long it stands idle, it is ready to give its full voltage the instant that the mains fail because there is no self-discharge. A NIFE battery is made principally of steel and so is chemically and physically almost indestructible. To this inherent reliability is added very low maintenance costs. No wonder hospitals and cinemas all over the world are using Nife-Neverfayle as their emergency lighting equipment.



NIFE-NEVERFAYLE

THE EMERGENCY LIGHTING EQUIPMENT

with the STEEL battery

NIFE BATTERIES · REDDITCH · WORCESTERSHIRE

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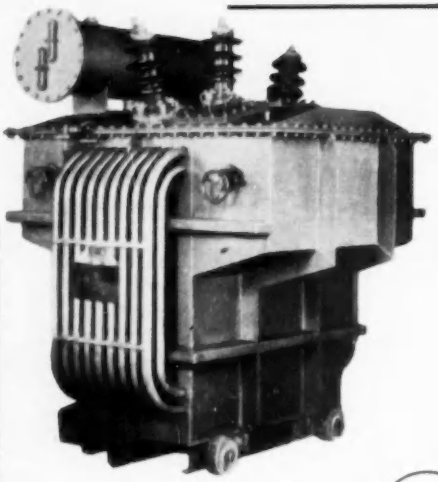

The following **TRANSFORMERS** are

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ex Government Stock

"OUTDOOR"

kVA	Tappings	per cent.	
2— 200	33000/440v.	2½ & 5	Hackbridge
9— 100	33000/440v.	2½ & 5	Yorkshire Elect.
6— 100	11000/400v.	5 & 10	Yorkshire Elect.
27— 50	11000/400v.	5 & 10	Bonar Long
9— 25	11000/400v.	5 & 10	Bonar Long
11— 100	6000/440v.	2½ & 5	Metro-Vick
5— 30	6600/3300/400v.	5 & 10	Brush
11— 50	3300/400v.	2½ & 5	B.E.T.
7— 25	3300/400v.	2½ & 5	Metro-Vick
9— 10	3300/400v.	2½ & 5	Merro-Vick

"INDOOR"

1—1000 6600/440/400v. 2½ &.5 Parsons
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8— 50 11000/400v. 5 & 10 Bonar Long

All unused. To B.S.S. 171/1936. Vector Group 41/DY/11. The 33 and 11 kV units are all fitted with conservator tanks, breathers and usual fitments. Covered by twelve months guarantee. Filling of grade "B" oil. For full specification and price apply :—

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Head Office and Works
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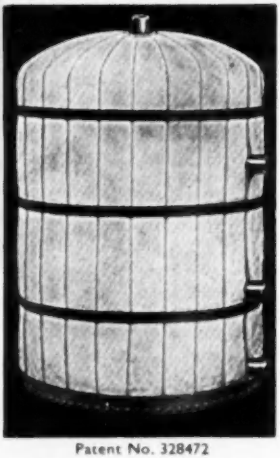
ELECTRICAL AND MECHANICAL ENGINEERS

SAVE FUEL COSTS



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CYLINDER JACKET.

Made in sections. Connecting pipes offer no difficulty. **EETO** jackets considerably increase hot water supply with less fuel.

Used in large numbers by Heating Engineers for Housing Schemes, and extensively in conjunction with Immersion Heaters, etc.

EETO jackets are also made for Horizontal cylinders, square and rectangular tanks.

- **Enormous reduction in heat losses**
- **Finest Insulating Materials only**

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EETO INSULATIONS

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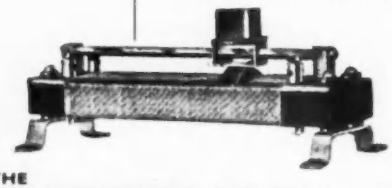
SEND YOUR RESISTANCE PROBLEMS TO US

List No. 80 containing data and prices of our standard sliding Resistances is both useful and interesting. May we send you a copy ?

- We shall be glad to co-operate in their solution and to suggest suitable Apparatus. CRESSALL Resistances incorporate the soundest electrical and mechanical principles in design—yet prices are competitive.



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MANUFACTURING COMPANY, LTD.
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Phone, Aston Cross 2666 (3 lines). Grams "Ohmic" B'ham

from

SenTerCel

Selenium Rectifier Equipments are manufactured in all sizes and types from the smallest to the largest and from the simplest to the most complicated.

Standard types for common applications are readily available.

In addition an Engineering Department is maintained to design equipments specially to customers' individual requirements:—

Battery Charging
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Dynamic Braking
D.C. Power Supplies of all types

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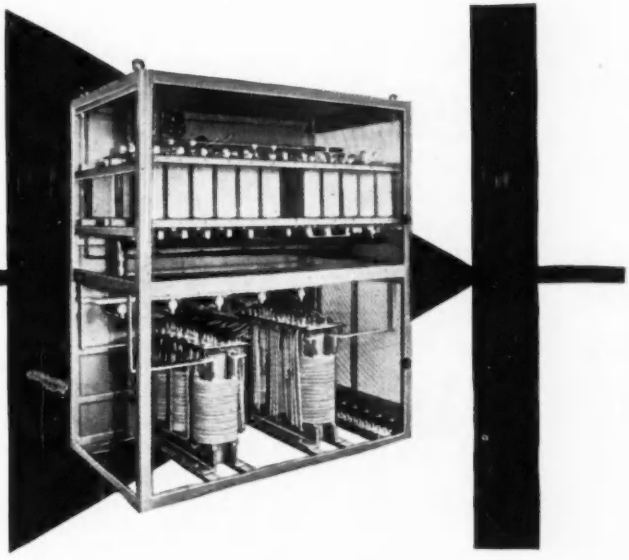


Top illustration: Portable Battery Charger
Lower illustration: Large D.C. Power Supply Unit

SELENIUM
SenTerCel
RECTIFIERS

Standard Telephones and Cables Limited RECTIFIER DIVISION

Registered Office: Connaught House, Aldwych, London WC2

Warwick Road, Boreham Wood, Herts. *Telephone: Elstree 2401 Telegrams: Sentercel Borehamwood*

SEE what's COOKING

The glass door is just one of the many good points of the latest Belling 46/47 Cookers. The sparkling finish and smart lines charm the housewife, and she loves the really large oven, so easy to keep clean as well. The engineer likes its construction (cast hob and front, of course), and E.D.A. Specification throughout makes it easy to service — not that it is often needed.

Our National Advertising Campaign in the daily and weekly press will help to make sales easier still.

47AB, 8" and 6½" boiling plates, grill boiler, glass door	£28.17.6
47A without glass door	£26.17.6
46AB, 8" boiling plate, grill boiler, glass door	£26. 5.0
46A without glass door	£24. 5.0

Drawer 20/-. Cream finish 10/-. Simmerstat 15/6. Radiant Plate 23/6

You can't beat a 'Belling'

BELLING & CO., LTD. · BRIDGE WORKS · ENFIELD · MIDDX.

CRC 355a

and now *Tudor for* BARKING 'C'

Repeat contracts are better than a lot of praise. For some years the Barking 'A' and 'B' Power Stations have had ample opportunity to test the efficiency of Tudor Batteries and the maintenance service provided by the Tudor Accumulator Company on the 6 batteries already installed there. Now comes a contract for the new Barking 'C' Station through A. Reyrolle & Co. Ltd., the suppliers of the Switchgear—convincing evidence that Tudor equipment matches its high reputation in this field. Write for publications No. 66A/1 and 69D.

Tudor

BATTERIES

SPECIFICATION & OPERATION OF BATTERY EQUIPMENT

Two 240-volt batteries each having a capacity of 400 ampere-hours will be installed, with duplicate Hewittic mercury arc quick charge rectifiers & Partridge, Wilson selenium metal trickle charge rectifiers.

The batteries will be used for operating Reyrolle switchgear, and will also supply emergency lighting and auxiliaries.

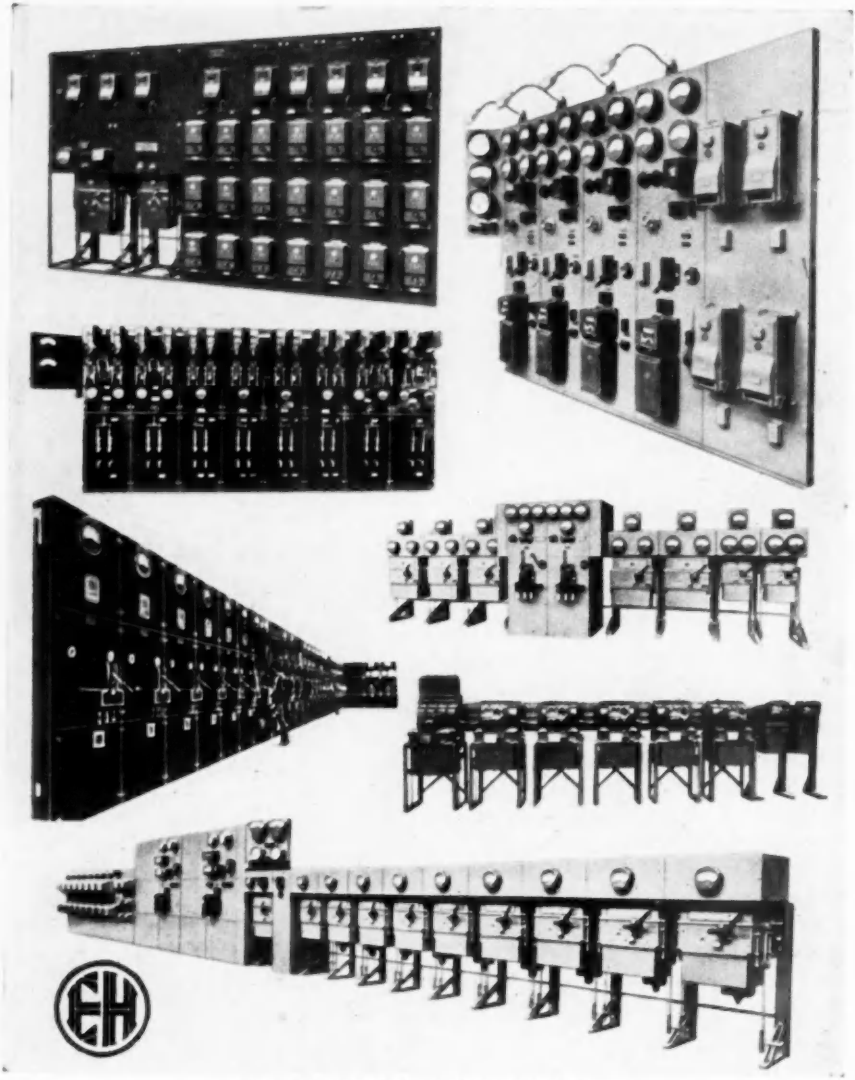
In normal circumstances one battery will float across the D.C. bus-bars and also across one mercury arc rectifier. The mercury arc rectifier will supply a continuous load having a maximum value of 15 amps, in addition to a trickle charge current through the battery. In the event of an emergency discharge being taken from the battery, it would be taken off the D.C. bars and quick charged by the mercury arc rectifier (capacity 19.8 kW.).

The second battery will be standing by on trickle charge. This will maintain the standby battery in a fully charged condition available for switching on to the D.C. bars should the first battery become discharged during a mains interruption.

T.105

THE TUDOR ACCUMULATOR COMPANY LIMITED 50 GROSVENOR GARDENS LONDON SWI

WE SPECIALISE *in all types of* SWITCHGEAR



AC & DC SWITCHGEAR 50 Amps/15,000 Amps.

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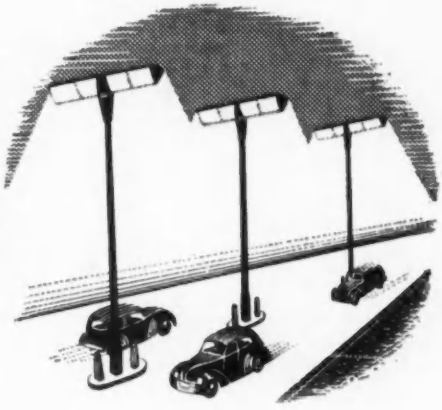

The Lamplighter has passed..

Nearly 50 years ago when we first started making Time Switches, the lamplighter was kept busy every evening. Now he is forgotten. We may regret the passing of a picturesque part of our evening street scene; but who will deny the saving in time and labour thanks to Venner Time Switches.

They are equally suitable for single or group control of street lighting and island bollards, as well as for 'half-night' and double circuit control of modern fluorescent lighting. Standard switches may incorporate solar dials, manual operating devices, and hand wound, synchronous motor driven or synchronous motor with spring reserve clocks as desired.

WRITE FOR LEAFLET T.S.21/ET

We also specialise in Process Timers, Programme Ringers, Stop Watches, Hour Recording Meters, Prepayment and House Service Meters, Delay Relays and Master Pendulum Clocks.

There is a VENNER *time switch for every purpose!*

VENNER Time Switches Ltd.

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BIRMINGHAM 6 ENGLAND

For consistent reliability
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SPECIFY HIGGS
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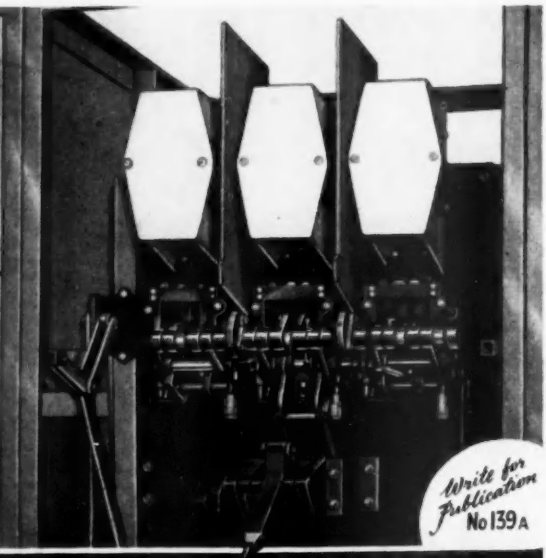
25 MVA
AIR BREAK CIRCUIT BREAKERS
ASTA CERTIFIED

As installed in new Palace of Westminster



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SPEED UP PRODUCTION

HENLEY SOLON MARK ELECTRIC SOLDERING IRONS

Henley Solons get through the job with speed and precision. Practical experience in factory and workshop has proved their capacity for continuous hard work under all conditions. 5 models: 65 watt oval tapered and round pencil bits; 125 watt oval tapered and round pencil bits; and 240 watt oval tapered bit. Voltage range: 100 to 250. Perfectly balanced; each with 6 feet 3-core Henley flexible. Equip your works with Solons and speed-up production. Now available from stock. Write for folder Y.10.

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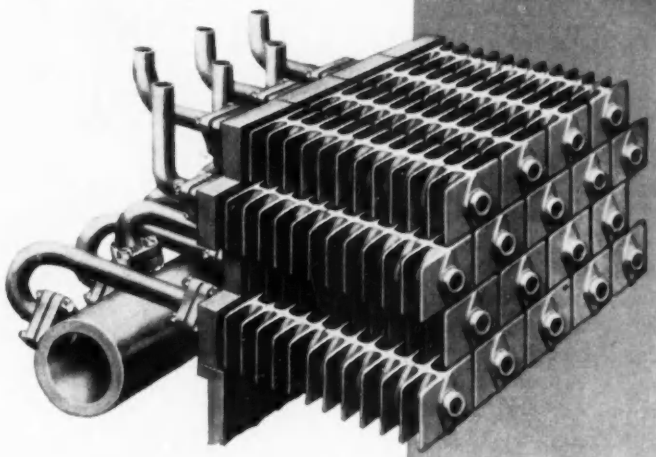
ADVANCED DESIGN.
READY INSPECTION..
LOWEST MAINTENANCE...

Green's Premier Diamond Economiser (Type 12) has all the above qualities and is suitable for the highest pressures.

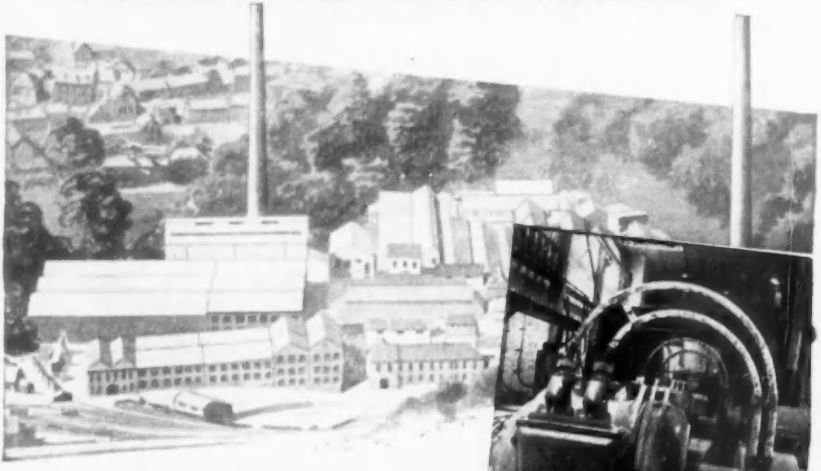


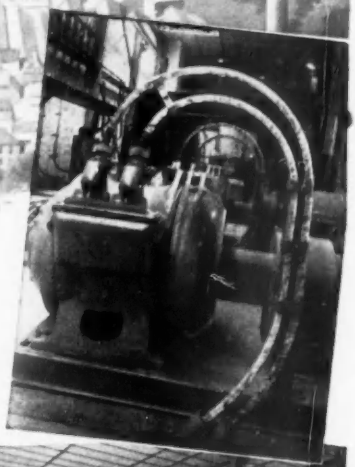
GREEN'S PREMIER DIAMOND economisers

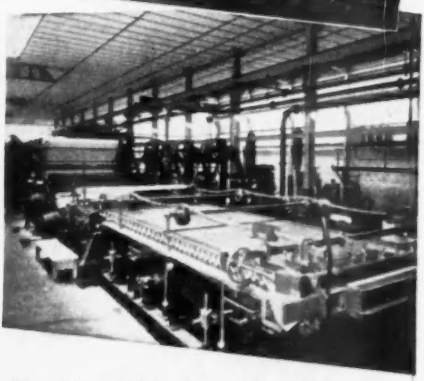
E. GREEN & SON LTD.. WAKEFIELD

Makers of economisers for one hundred years

Industrial Installations







VALLEYFIELD PAPER MILLS OF ALEX. COWAN & SONS, LTD.

Since 1779, high-grade paper has been manufactured in Scotland by successive generations of the Cowan family at Valleyfield Mills, Penicuik. This important mill is completely electrified, and with the recent installation of a replacement machine for making up to 92-in. width paper, is one of the best equipped in the country. Cables for all electrical purposes have been supplied by BICC—who manufacture a range of cables suitable for every type of industrial installation.

With BI Callender's CABLES

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

IF YOU COOK FOR

6, 16 OR 60

CHOOSE THE

Creda restaurant range

Economical cooking for 6, 16 or 60 people—with only one range. Two ovens, one large, one small, cope with fluctuating meals and reduce cooking costs to a minimum. There is a separate grill and a self-contained and separately-heated plate-warming drawer. Five hotplates give absolutely first-class boiling and simmering facilities. The steel and cast iron construction make the new Creda Restaurant Range a rugged hard-worker and the vitreous enamel finish takes the toil out of cleaning. Write to us for further details. We are always ready to advise on any catering problem

CREDA HEAVY DUTY COOKING EQUIPMENT

for hotels, restaurants, cafes,
guest houses, schools, colleges, hospitals and factory canteens

MADE BY THE HOUSE OF Simplex

Simplex Electric Company Limited
Oldbury Birmingham and Branches

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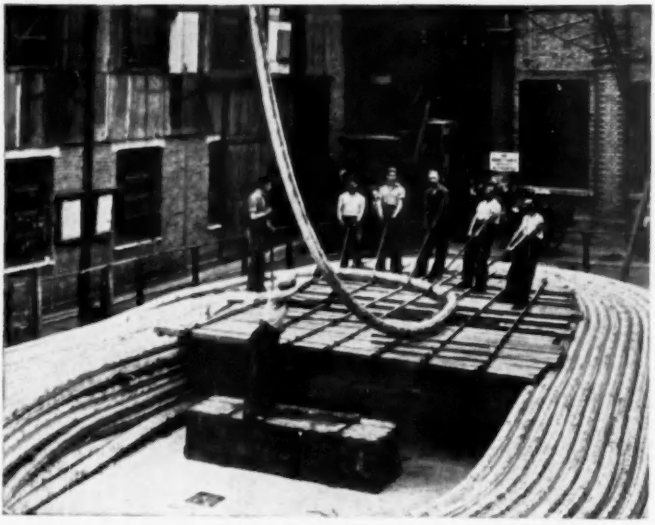


SOLENT SUBMARINE CABLE

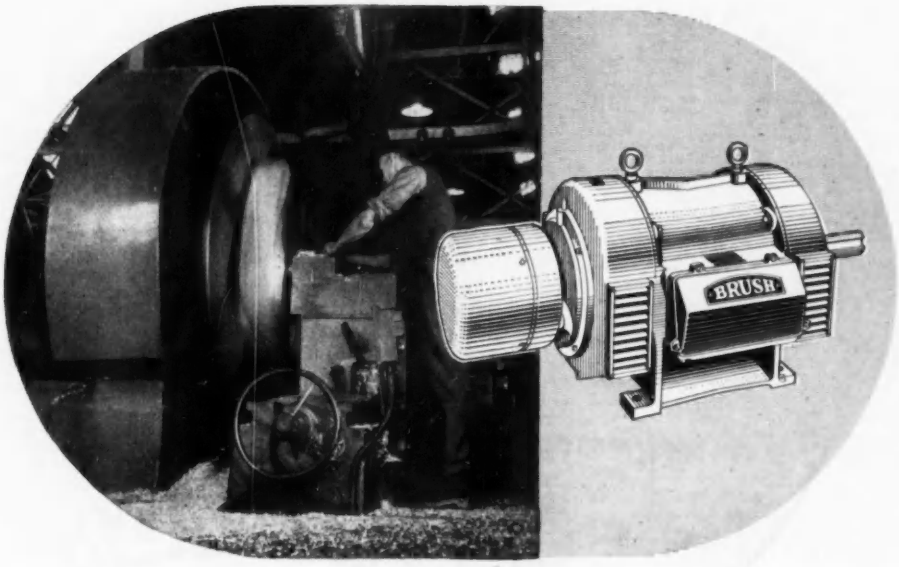
This recent 33,000 v. Submarine Cable laid across the Solent to the Isle of Wight provides, with its counterpart laid in 1947, a supply of 34,000 k.v.A from the mainland. The cable has a total length of 3 miles and a weight of some 250 tons.

This reinforcement to the NATIONAL GRID bears the hall-mark of the **C.M.A.**

MAINS CABLE MANUFACTURERS ASSOCIATION
MAINS CABLE MANUFACTURERS ASSOCIATION (SUPER-TENSION)

RUBBER & THERMOPLASTIC CABLE MANUFACTURERS ASSOCIATION
Affiliated to
CABLE MAKERS ASSOCIATION
52-54 High Holborn, London, W.C.1. Tel: Holborn 7633

Pioneer and leader too!



To have been a pioneer proves vision. To have continued to pioneer—as Brush have pioneered for upwards of 70 years—brings that degree of efficiency, economy and reliability which can justly be called leadership.

The Brush range of A.C. motors includes sizes from 1 to 1500 h.p. slipring or squirrel cage. The Brush D.C. range covers standard requirements enabling the most economic size to be selected for any given duty.

the best answer is **BRUSH**

The Brush Electrical Engineering Co. Ltd., Loughborough, England

London, Birmingham, Cardiff, Manchester, Leeds, Newcastle, Glasgow

15.16

Unsurpassed for efficiency with economy

MAZDA

the outshining light

MAZDA fluorescent lighting gives soft, diffused, shadowless light. This means that workers are brighter, more alert. Eyestrain is eliminated, efficiency and output increased. And above all, current consumption is reduced to less than half. More and more people are proving the extra value of the new MAZDA-MELLOW fluorescent lamp in clubs, offices and canteens as well as in hotels, restaurants, showrooms and the home. It creates a warm, friendly, mellow atmosphere and adds new charm to beauty, new luxury to furnishings and new delight to food. MAZDA-MELLOW lamps cost no more than ordinary fluorescent lamps. For further details consult any of the BTH offices throughout the country.

MAZDA LAMPS AND LIGHTING EQUIPMENT

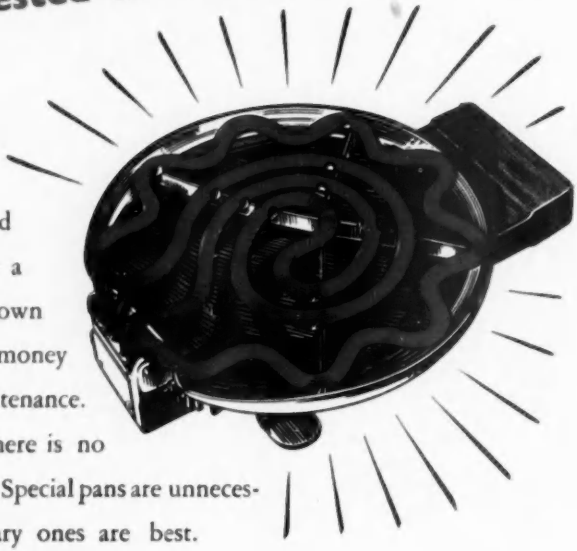
Made in England by BTH *Leaders in Lighting*

The British Thomson-Houston Co. Ltd., Crown House, Aldwych, London, W.C.2. Tel: TEMple Bar 8040

M4261

Stirling
AT KINGSTON-UPON-THAMES POWER STATION
THE STIRLING BOILER CO. LTD., 34-36 FARRINGDON ST., LONDON, E.C.4

Are you interested in electric cookers?



If so, you will be interested in Redrings, which give a glowing heat that cuts down cooking times and saves money in electricity and maintenance. When switched off there is no lingering wasted heat Special pans are unnecessary; in fact, ordinary ones are best.

Redrings can be supplied to fit all postwar cookers made to EDA interchangeability specification (8" and 6¼" Two Circuit and Single Circuit Boiling Plates, 10½" x 8" Grill Boiler). The majority of older cookers can also be fitted.

REDRING

The Metrovick Radiant Boiling Plate

METROPOLITAN-VICKERS ELECTRICAL CO. LTD.

TRAFFORD PARK, MANCHESTER 17

L/C 001

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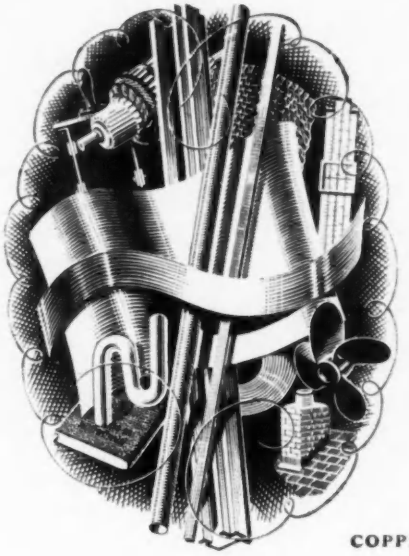

Helping COPPER to help the nation

COPPER DEVELOPMENT ASSOCIATION exists to promote the wider and more efficient use of copper and its alloys and to bridge the gap between technical developments and their practical application in industry. The C.D.A. is backed by the resources of the whole British copper industry and is in a unique position to help copper to help you, no matter what your interest may be.

The Association, which is a non-trading organisation, can tell you what copper and its alloys can or cannot do and how they can be used to the best advantage. Its services are available to all entirely free of charge or obligation. You have only to ask.

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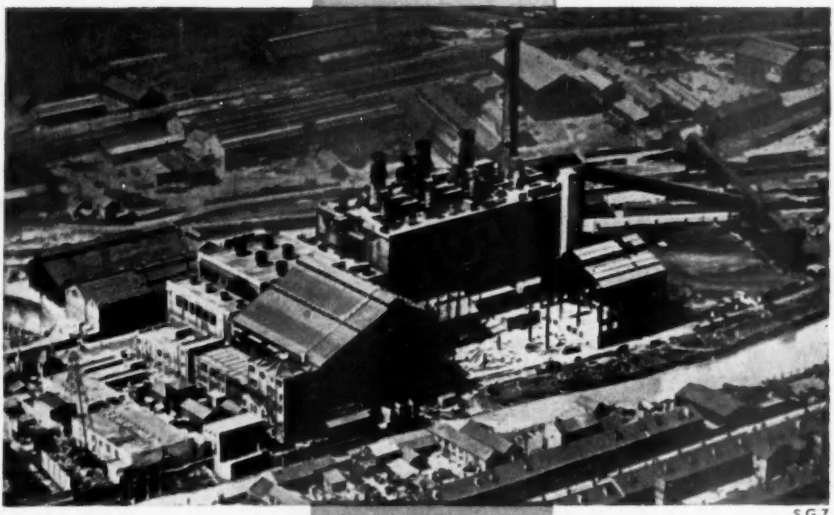
POWER IN THE MAKING



S.G.7

No. 7—Rotherham

In 1920, the Prince of Wales Power Station was operating with boilers working at 200 psi. When extensions were planned in 1938, it was clear that more advanced steam conditions would be needed to get the required output from the space available. 'INTERNATIONAL' tri drum boiler units were installed to work at a pressure of 625 psi with a final steam temperature of 858°F, each unit having an evaporation of 200,000 lbs. per hour at maximum continuous rating. All these boilers were fired by 'L' Type Travelling Grate Stokers.

Further extensions are in hand, and two similar 'INTERNATIONAL' tri drum boilers will provide the steam supply. At maximum continuous rating, the evaporation of each boiler unit will be 260,000 lbs. per hour at a pressure of 625 psi and final steam temperature of 859°F. The new installation will be fired by 'INTERNATIONAL' Spreader Stokers, with continuous ash discharge at the front of the boilers. These stokers combine with grate burning some of the characteristics of pulverised fuel firing, the fines being burnt in suspension.

ICL

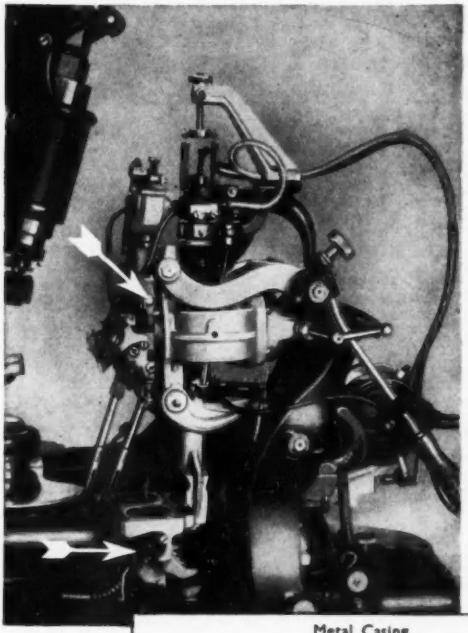
INTERNATIONAL COMBUSTION LTD

London Office: NINETEEN WOBURN PLACE, W.C.1
Works: DERBY, ENGLAND; PORT ELIZABETH, SOUTH AFRICA; SYDNEY, AUSTRALIA

B T-H

INDUSTRIAL HEATERS

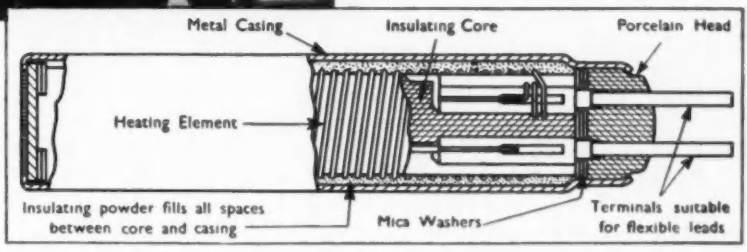
for applying Localised Heat



The cartridge heater is but one of the many forms of industrial " Pyrobar " heating equipment developed and perfected by BTH. It fulfils the need for a small robust self-contained heater in the most convenient form for generating localised heat to process machinery and many other devices—suitable for A.C. or D.C. supplies up to 250 volts—from 30 watts to 500 watts—diameters varying from 1/2 inch to 15/16 inch.

Left: Showing application of localised heat in a shoe-stitching machine. Positions of cartridge heaters indicated by white arrows.

Below: Sectional view showing construction of typical cartridge.



Other types of industrial heating equipments manufactured by BTH include: immersion, salt bath, radiant, and soft-metal heaters. Electronic heating equipment is also available

BRITISH THOMSON-HOUSTON

THE BRITISH THOMSON HOUSTON CO., LTD., RUGBY, ENGLAND

A 4045

Meico COLD CATHODE LIGHTING for INDUSTRY

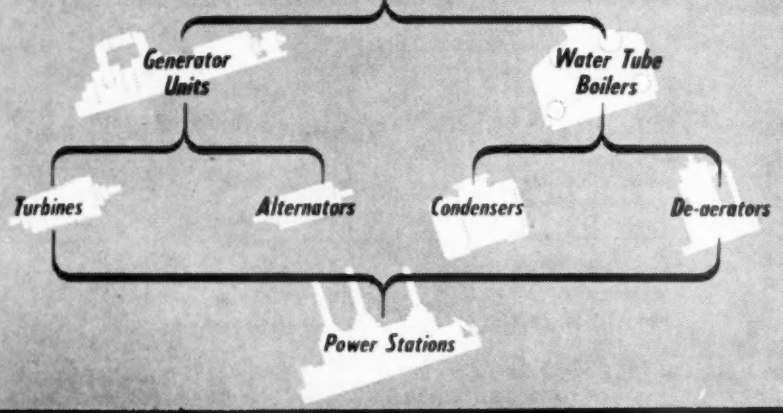
An example of Meico Cold Cathode Industrial Units at a textile mill in Cheshire. For economic and scientific lighting more and more industries are installing Meico Cold Cathode Lighting.

MICRAMATIC Limited

HEAD OFFICE - WOOTTON MOUNT, OLD CHRISTCHURCH ROAD, BOURNEMOUTH, HANTS.
WORKS - CONGLETON, CHESHIRE.

An Omnibus Land Power Supply

RICHARDSONS WESTGARTH
MAKE POWER SCHEMES WITH



RICHARDSONS, WESTGARTH & CO. LTD. HARTLEPOOL

Part of main sub-station installation of 31 class-SA panels

Air-break switchgear

★ AIR-INSULATED
★ METAL-ENCLOSED
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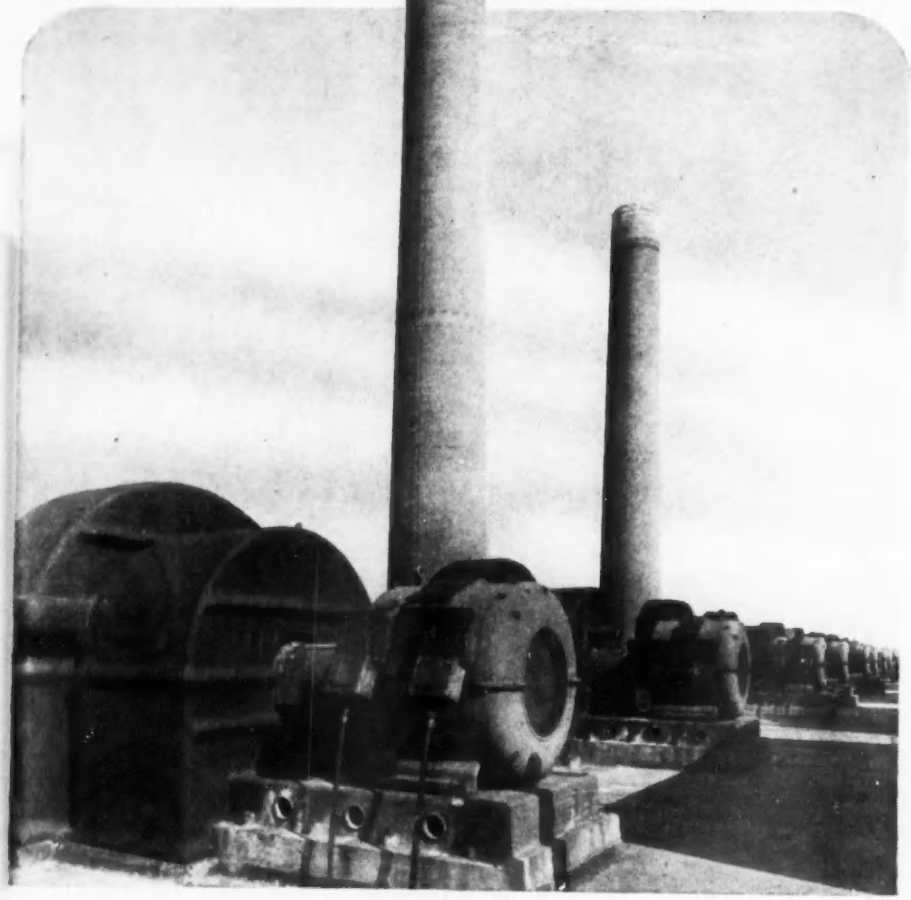

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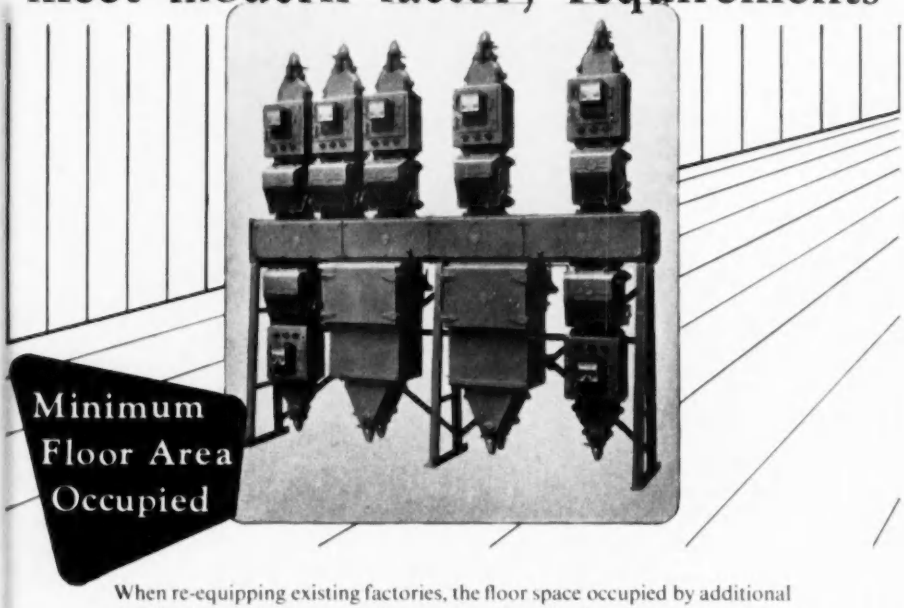

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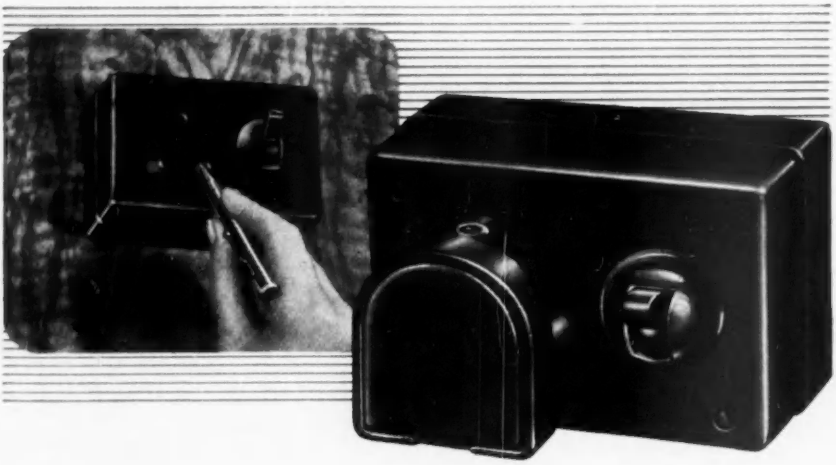

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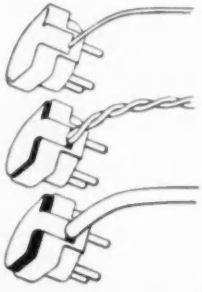

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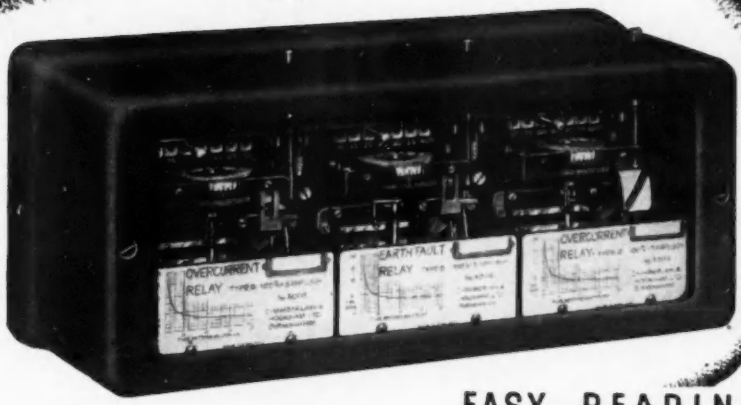

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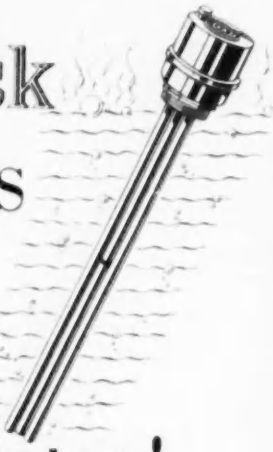
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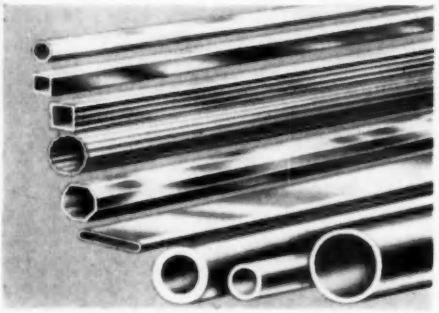

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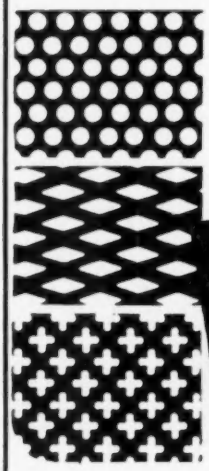

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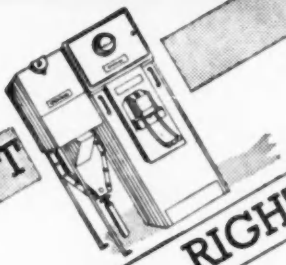

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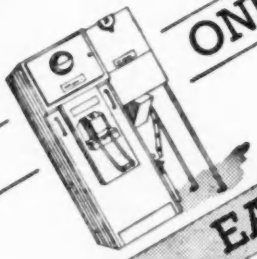

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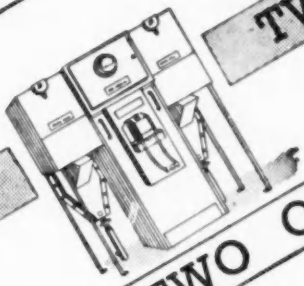

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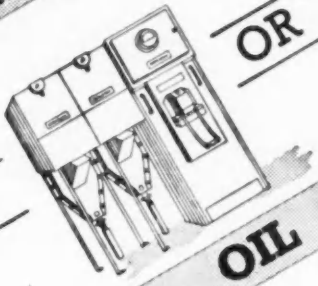

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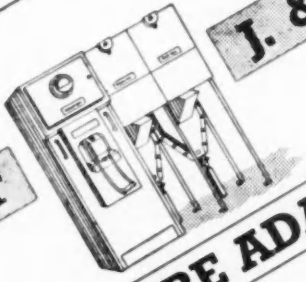

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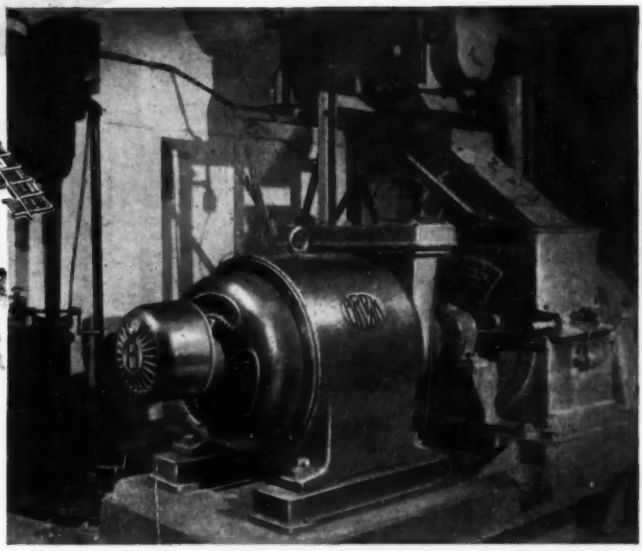

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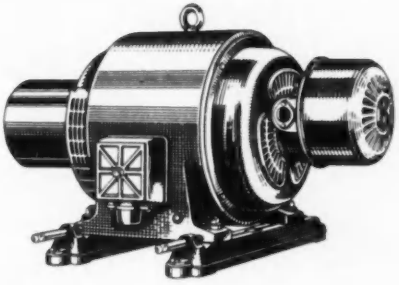

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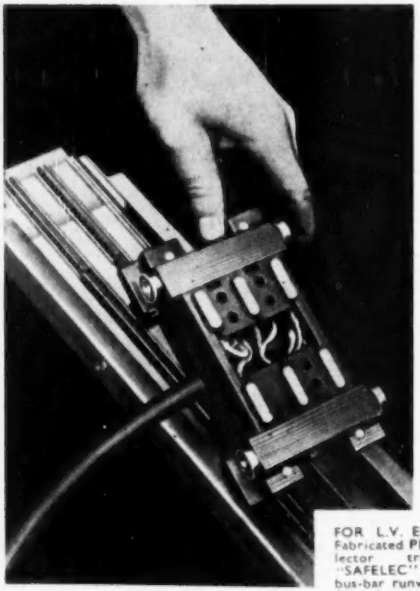

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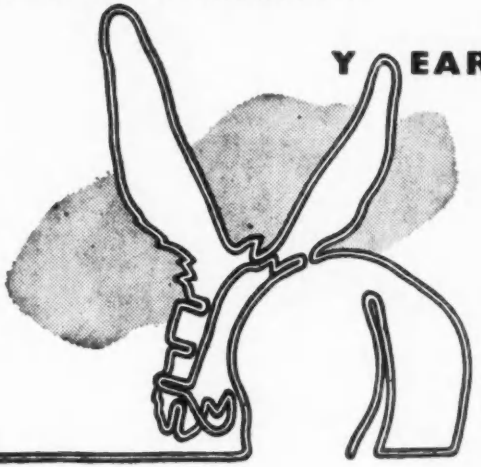

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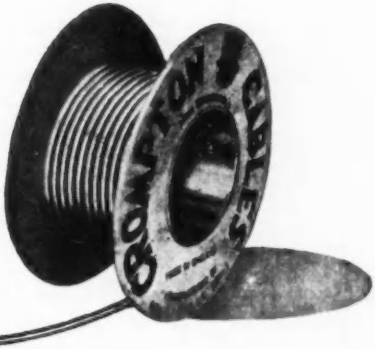

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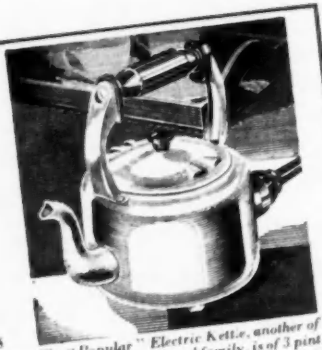

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ELECTRICAL TIMES

Vol. 118 No. 3063 THURSDAY, 20 JULY, 1950

PUBLISHED EVERY THURSDAY

FIFTY-NINTH YEAR OF PUBLICATION

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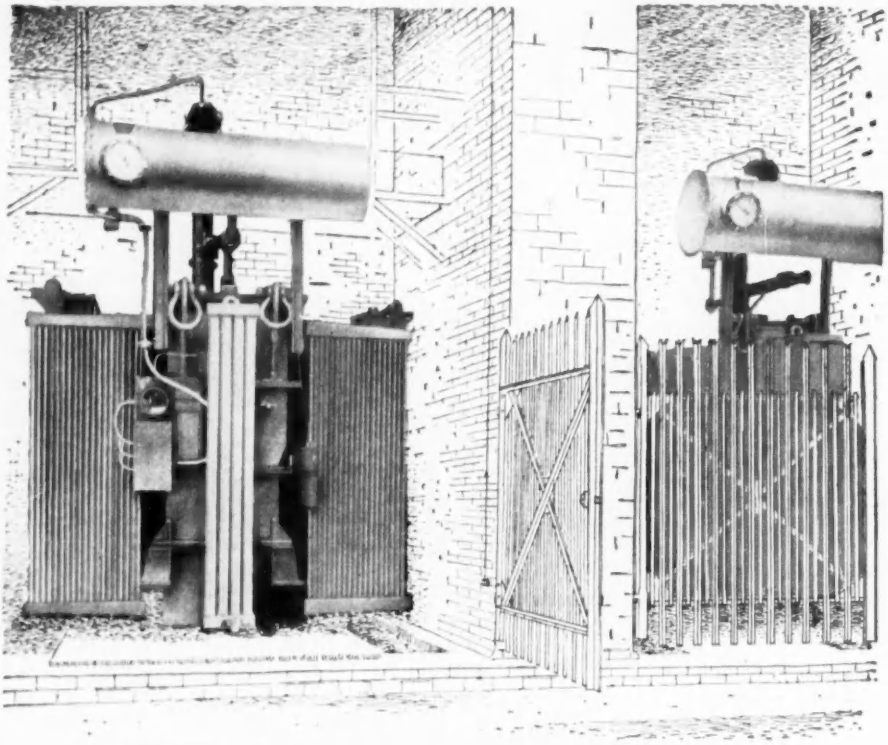

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by G.E.C.

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Editorial

INCENTIVES FOR WIRING

THE STRONG advocacy of incentive payments in the building industry usually stops short at electrical installation, for it is commonly felt impossible to determine a satisfactory basis for output bonuses on wiring work in view of the diverse conditions. In an article in this issue, however, Mr. Gilbert concludes that such schemes are possible for installations using insulated conduit. While we do not question this conclusion, we feel it does not go far toward solving the problem. The traditional material is steel conduit, and tradition dies hard. If, therefore, a method of applying incentives is to be introduced at the present time, it seems essential that it should be based on existing methods and not on material with which employers and wiremen are, in the main, unfamiliar. In speaking of incentives schemes, however, "quantity" is too frequently considered as the only desideratum but installation work is one where quality also must count. This suggests that the lesser known incentive method based on personal assessment might provide a more suitable basis. Such schemes have proved successful in other spheres and it would seem that the nature of electrical work is one which lends itself to this technique of providing bonuses to the best workmen. It would be difficult to develop a general form for its basis of application, owing to the wide variation in size of firms, but if our present economic and moral set-up is one which demands incentive bonuses, then this might be the way they could be applied.

ATOMIC POWER—NOT YET

AMONG the many technical sessions held at the Fourth World Power Conference, that on atomic energy was outstanding as an international public gathering of experts in a technology which has been the subject of so much conjecture. Little could be expected in the way of fresh information, secrecy regulations prevent that; but the opportunity did exist for the scientists and engineers working in this field to give their opinions on the probable rate of development. Universally they were cautionary: atomic power plants are not just round the corner. Their views were adequately summed up by Sir Harold Hartley, when he spoke of the need to differentiate between what could be done at any cost and what may be achieved economically. So it remains for those concerned with the more traditional sources of power to continue their unrelenting pursuit of the few per cent greater efficiency relatively free from the disconcerting thought that their work may very shortly be rendered obsolescent by nuclear power for Everyman. Those who are investigating the possibility of using the earth's stored heat energy and that contained in solar radiation will also find encouragement in the position.

MAINLY METALS

ANSWERING one of the questions raised during the discussion on atomic energy, Sir John Cockcroft said: "That depends on how well the metallurgists do their job." His phrase was characteristic of much that was said in the heat engine sessions of the conference. Higher temperatures and more corrosive conditions of operation are involved in almost all schemes to increase efficiency of plant, and the problem is being passed back to the steel makers and their research workers. At the moment austenitic alloy steels are used for 1,050° F. and above, and "austenitic" must have

been used by speakers more than most technical terms. With the Americans talking of 1,200° F. for steam turbine operation it is obvious that a concentrated attempt must be made to overcome the low thermal conductivity, high coefficient of expansion and other undesirable features of steels of this type. In particular, their high cost must be reduced if the increased efficiency gained from the higher temperature cycle is not to be offset by the disproportionate increase in capital cost of the plant.

A COMMUTATOR MOTOR?

"A.C. commutator motor" is a phrase which is often loosely used. Strictly speaking, it would apply to almost anything which possesses a commutator and does not require a d.c. supply, from a plain series f.h.p. motor to the Winter-Eichberg-Latour compensated repulsion motor whose vector diagram threw black clouds over our student days. In actual practice, it is usually understood that the term refers to a polyphase variable-speed machine which operates as an induction motor with variable slip frequency. Even then it is not an exact specification, since it does not make clear which type is meant; the Schrage rotor-fed type which is regulated by brush shifting, or the stator-fed type with fixed brushes and an external regulator, and the two are often confused. Feeling that the commutator motor does not always receive the attention it deserves, we publish, elsewhere in this issue, an article dealing with the operating principles of both types, which should appeal to students and to engineers who wish to refresh their memories. A further article in course of preparation deals with the operation and maintenance of these machines from the practical engineer's viewpoint.

THE EGG—AND US

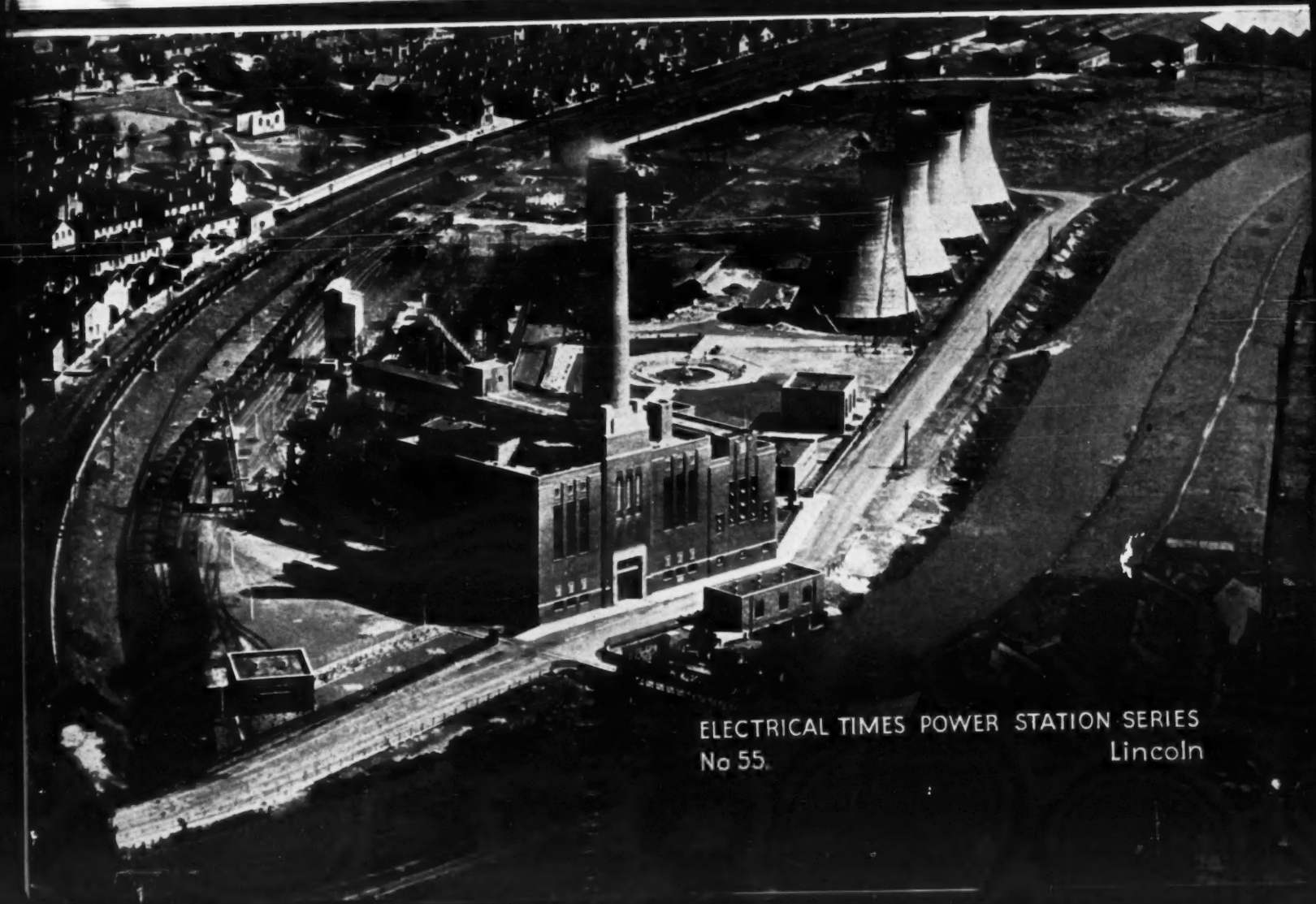
THOSE who have never visited a modern poultry farm may not realise what scientific methods—plus electricity—have achieved. The days when hens scratched for worms and casually deposited their eggs under dilapidated farm carts have gone for ever—the modern hen has gone all-electric in a big way. We have recently been privileged to view the plans of a modern "battery," as these mechanised henneries are termed, which consists of row upon row, eight tiers high, of compartments, each containing a hen. Down the aisles proceeds at a stately pace what we can only describe as a combined stoker and ash-handling plant mounted upon a motorised trolley, dispensing food, grit and water. This, we are told, can also dispense music to stimulate—a sort of "Workers' Lay-time" programme, we assume. The entire gadget can be fitted with remote control, thus rendering it unnecessary to get out of bed except to collect the eggs. Here, we fancy, is its weak spot. In spite of the electrically-driven platform to convey the attendant along the upper floors, we feel that some system of magnetic conveyors (with photo-electric counters) should be devised so that one would never have to look at a hen again.

Meteor

THIS WEEK'S PHOTO

LINCOLN generating station, formerly known as St. Swithin's, is operated by the East Midlands Division of the British Electricity Authority, and is part of the Leeds Grid control area. The station is situated on the north bank of the River Witham, bounded on the north side by the Lincoln-Grimsby railway line, from which is a loop serving the generating station sidings. The original St. Swithin's station was built by a private firm and was taken over by the Corporation in August, 1919. To meet the increased demand by the town, two 5,000 kW sets were commissioned in 1922. Lincoln was a selected station on the grid system and had a capacity of 14,000 kW when the "B" station was commissioned in December, 1947. The "B" station contains two 20 MW Brush turbo-alternators, operated at 400 lb/sq in., and 800° F, with four Babcock and Wilcox 120 k lb/hr chain grate boilers. The four Mouchel cooling towers have a capacity of 2,000,000 gal/hr. The station generates at 6·6 kV, stepping up to the grid voltage of 132 kV, and has feeders from the grid substation to Grimsby, Rotherham and Bourne.

In the year ended March 31, 1949, Lincoln supplied 72·8 million units at a load factor of 30·43%, and a maximum demand of 25·7 MWso. The maximum demand for the year ended March 31, 1950, was 45·2 MWso.


ELECTRICAL TIMES POWER STATION SERIES
No 55.
Lincoln

The Wiring Industry —*and Incentives*

By T. C. GILBERT, M.I.E.E.

THE reports of the Building Industry Working Party, set up in 1948 by the Minister of Works, and the Girdwood Committee, instituted by the Minister of Health, are now available, and have much to say regarding the desirability of introducing or extending incentive payments and bonusing schemes into the building industry. In connection with the two most recent awards relating to wages in the electrical contracting industry the National Arbitration Tribunal urged that payment by results should be seriously considered in connection with electric wiring. The electrical industry has held, however, that incentive schemes are not easily applicable to skilled trades in general, or to electrical installation work in particular, owing to the diversity of wiring systems used and conditions of installation.

Responsibility for Delays

In the writer's view, neither of the reports mentioned above stressed the adverse effect upon the main contractor of delays and hold-ups due to sub-contractors, of which probably the electrical contractor is the chief offender. He cannot be blamed, however, if the wiring system that has been specified for the housing work is one particularly vulnerable to weather conditions, or to damage by following trades, but he can be if the choice of the wiring system is due to his own advocacy. It is all very well to say that the architect is the man responsible for the specification, but he, after all, is led by the industry, and goes by what his pet contractor considers to be a suitable system. In effect, it is the electrical contracting industry that must be held responsible for the wiring systems now used for housing, with which the reports mentioned above are mainly concerned. The manufacturer may introduce a new wiring system to the architect, with undoubted advantages from housing progress angle, but its acceptance will too often depend upon reference back to the local supply authority wiring department, or to a contractor friend.

Traditional Methods

The installation industry in this country has been brought up in the tradition that steel

Flexible conduits are laid on top of pre-cast floor blocks, under floor fill, in a fraction of the time required for heavy-gauge steel conduits

(Photograph by courtesy of Messrs. George Newnes, Ltd.)

Point-to-point lighting wiring conduits run in unorthodox positions, eliminating joist-slotting and wall chasing.

Photograph by courtesy of Messrs. Flexible Non-Metallic Conduits Ltd.)

conduit is the only true wiring, and that earthing is its prophet. The recent electrical contractors' conference revealed a complete lack of really new ideas in technique or practice, and its discussions appeared mainly concerned with methods of improving the old systems in respect of known drawbacks. As heavy-gauge steel conduits are usually too expensive for housing work, as well as being unnecessarily unwieldy, recourse is had to light-gauge steel conduits, and which system probably comprises 90% of housing installations today. As the safety and efficiency of such systems depends in the last resort on complete and meticulous attention to continuity between conduit and fittings, the writer would agree that such systems are definitely not suited to payments by results ; nor can such systems lend themselves to prefabrication away from the site in any attempt to improve speed of installation.

There is, however, another serious criticism of the practice of using rigid metal conduit systems for housing, and that is the delay introduced, and difficulties provided, for the main contractor, even to the extent of ruining his own incentive schemes. The usual English practice—it is different in Scotland—is for the electrical contractor to wait until the roof is on and the building reasonably watertight, and then cut conduits into the first-floor joists; he then goes away to await the erection of internal partitions following the partial laying of the floor—it cannot be complete as various traps and loose boards must be left over conduits and boxes. Should his later visit be delayed—and housing electrical contractors are not usually over-flush with operatives—the plastering work may be held up, or if it is proceeded with, then chases must be cut in finished work with later making good.

These delays are common, and can stultify incentive schemes for both carpenters and plasterers, the former complaining that they must be able to make complete sweeps of flooring through blocks of houses if the bonusing is to be any good to them. A carpenter hates going back over his work to take up boards previously laid, which must happen if the electrician has not got to the job in time; he also dislikes taking them up by reason of nails through the conduits, which occurs quite frequently when speedy laying is accompanied with incentive payments. The chasing of green internal walls is often accompanied with collapse, and with the thin skims of plaster now generally applied chasing must be reasonably deep if the all-too-evident rust streak down the wall is to be avoided. A possible later seach for a bad continuity junction does not usually result in improvement in relations between electrical and main contractor.

All these difficulties appear to arise from the choice of an unsuitable and clumsy wiring system for housing work, which should now be treated as something special. In the national interest, the electrical industry should concentrate upon the use of wiring systems that will not, at least, interfere with the builder's bonusing schemes, even if such incentives are not applicable to the wiring work itself. If housing were only a few per cent cheaper there would be more of it to do, as some of the capital cuts now considered inescapable could possibly be avoided. In this direction, the

installation industry would appear to have a special responsibility, and the solution to the problem is not far to seek.

Insulated Systems

The writer would not have the slightest hesitation in applying incentives to wiring work in connection with the insulated wiring systems, in which continuity is provided by means of a special conductor, thus eliminating the time-wasting and uncertainty attached to continuity with light gauge conduits. It is no very difficult matter to secure reasonably good continuity for the initial test before connection to the main supply, but tests made a few months later too often tell a very different story. The writer has records of tests made on several housing estates which show the complete unreliability of grip-continuity fittings, but every confidence can be reposed in wiring systems that provide an earth continuity conductor in the form of a special copper conductor.

Actual installation of such insulated systems, whether T.R.S. or flexible non-metallic conduit, must then be subject to new ideas in locating them, the old slotting or boring of joists being eliminated, with, to a great extent, chasing of walls. The practice of using steel conduits to enclose insulated wiring systems between ceiling and switch point should be cut out, as Regulations will permit their burying under plaster without this doubtful addition. It is possible to permit the main contractor to go ahead with all floor laying and the erection of all internal partitions before the wiring work need be started, and it can then be wiped off at one go, with comfortable working on laid floors instead of knee-wrecking joists. An illustration is shown of the adoption of such unorthodox runs for non-metallic conduit, but the same arrangement could, of course, be made for T.R.S. cables; incentives can be applied for speedy installation, and there is no costly cutting away for either the main or the electrical contractor.

These methods are not Utopian or far-fetched, but are, on the contrary, being employed on hundreds of local authority houses with considerable reduction in wiring costs. Often, it must be said, they have been enforced against the views of the local electrical installation people, and the reason for such opposition is felt to be a natural reaction against undue simplification of the wiring craft, apparently to prevent the entry into the industry of undesirables and the unskilled, out for the quick profit. It is pointed out, however, that this invasion has already taken place, as according to the Working Party report, mentioned above, there were 2,281 firms carrying out installation work in 1945; 4,728 in 1947; and 5,004 in 1949. It is considered likely, according to the report, that if contractors who employ no operatives are taken into account, then the number is substantially larger today, a view confirmed by the writer's own observations.

Reductions in Costs

That valuable, but much-neglected publication, Post-War Building Study No. 11, Electrical Installations, was issued in 1944, with a view to reducing wiring costs in the heavy housing programme visualised, but for all its practical effect it might as well never have been prepared. It will be remembered that in addition to its advocacy of the ring-circuit, it proposed various economies in wiring sizes, and the following appears on page 19:

> Lighting circuits, 1/·044.
>
> Socket-outlet ring circuit, 7/·029.
>
> Cooker circuit, 7/·036.

Opposition to the ring-circuit is dying down, but it is still there, and judging from letters appearing in the technical press, the opposition comes mainly from the installation side of the industry. Opposition to the use of 1/·044 cables, with smaller conduits, is implacable, however, and very few housing estates have cooker circuits in less than 7/·044. It is curious to note that the most vehement opponents of single-strand cables cheerfully install m.i.c.c. cables with a similar conductor, and wire for telephone circuits with even smaller single-conductor cables. The present cost of getting a maximum of half an ampere to a lighting point is much too high, and the writer would have no hesitation in using a 1/·036 wire for the purpose.

As an old contractor, the writer would strongly urge upon his colleagues the serious consideration of cheaper and simpler wiring systems for housing in view of the wide national interest, having as their secondary, but possibly more important effect, improvement in site organisation and bonusing for the main building contractor. Some of the present rather extravagant standards can be retained for other work, but housing today is surely a special case. The manufacturer can only do his bit in providing the simpler wiring systems; it is up to the electrical contractors and wiring departments of supply authorities to secure their adoption and use, even if they run counter to tradition and practices hallowed by long usage.

Our readers' views ...

The Cooker Position

IT is obvious from the article by "Commercial Officer" in your issue of June 22, and from the ratio of electric cookers to gas cookers that are now being installed, that something is wrong with the Electricity Board's policy.

Why pay large sums in advertising with the sole object of making our domestic consumers dissatisfied with their present electric cooker and advising them to change it? Why do we omit to cater adequately for the majority of consumers who desire electric cooking, but will not enter into a hire purchase agreement?

Why not hire any type of cooker to any consumer who wishes to use electricity for cooking? He can be charged on a scale which will suit his purse and the rent will cover the Board's expenses if it is spread over a minimum of ten years. It will be found that on some undertakings more than 50% of hired cookers are still in use after ten years in circuit.

Why do the Boards bicker over making various authorities pay a capital contribution towards the cost of some of the new housing schemes (unless the electrical wiring installation is such that it appears to guarantee sufficient revenue) and then refuse to hire an up-to-date cooker to a tenant occupying an up-to-date house? Why don't they make a charge (say £6) for each domestic service cable with a rebate (say £4) if a cooker point is installed, and so ensure a capital contribution in any case and a high percentage of cooker points in all new houses?

Q. Mark

HERTS

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The Resistance of Water Mains

I THANK Mr. Fawssett for his comments on my article, but I might retaliate by saying that he would, apparently, happily condone earthing to gas mains provided that at all costs direct earthing can be retained; anything to prevent the use of an earth leakage circuit-breaker!

I am even more perturbed to learn that an apparently factual investigation and report into serious occurrences may be seasoned with "sops" to particular interests. Surely there is no place for such divergences in an important report, and Mr. Fawssett does a great association an injustice by the mere suggestion. If taken seriously, it can only mean that future reports must be accepted with some reserve.

It is interesting to note that fire risk is being dealt with in future investigations, but may we hope that the interests of fire extinguisher manufacturers will not entirely be overlooked?

T. C. Gilbert
M.I.E.E.

FOLKESTONE

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Power Station Chemists

THERE has lately been a tendency for British Electricity Authority Divisions to advertise the position of a Senior Power Station Chemist with an acceptance of a Higher National Certificate in Chemistry as a qualification. To those of us with a sense of conscientiousness and duty towards the industry this must cause considerable surprise and disquiet. It does not appear to be realised that in the chemical profession the possession of the H.N.C. is not regarded as indicating that a man is properly qualified as a chemist or that he has the requisite training to qualify him as such. The H.N.C. is a diploma for a laboratory assistant or technician or for a junior assistant as a stepping-stone to proper qualification. From the level of the H.N.C. the student has at least two years further study in chemistry in order to sit for a degree, and in addition he has the extra subjects for his Intermediate and ancillary subject or subjects in his Final. Very similar conditions apply for the examinations for the Associateship of the Royal Institute of Chemistry, and, in fact, more than two years are often necessary in chemistry alone, very particularly on the practical side. The Associateship examinations are held four times a year, and there is never more than a 50% pass list owing to the high standards set by the Institute. The H.N.C., even with distinctions, exempts from no part of the Associateship examination.

After qualification, the chemist needs several years' practical training and experience in industry and much post-graduate study before he is competent to take over the responsibilities of a Senior Station Chemist. It is true that experience in testing coal, oils and water, etc., is usually asked for. Knowledge of routine testing, and perhaps a super-

ficial idea of water conditioning and boiler fouling, does not in any sense connote that wide experience of chemical technology and adequate basic training in chemistry the Station Chemist should have. It is quite possible for routine testing to be done reasonably well without the tester having any real idea of what he is doing, let alone give a correct interpretation in the light of his tests.

The increase in temperatures and pressures, with the consequent strain on materials of construction and the greater complexity of the modern power station, demand ever increasing standards of technical competence and experience. This desired increase is as great in the case of the chemist as the engineer, and his work should impact on practically every phase of generation. He should, today, have to play a very considerable part in the economy, efficiency, continuity and maintenance of electricity generation and supply, a far greater part than many engineers, for some curiously unknown reasons, appear willing to concede. Once the design of the plant is fixed, the reliability of the plant and most of the economics in the cost of generation are to be looked for in the scientific control of the chemical part of the cycle. The main raw materials, coal and water, are chemicals, and their progress throughout the plant and their corrosive and other effects on materials of construction also chemical. Combustion is a chemical process, and its efficiency a matter of much concern to the chemist. The safe conduct of the water throughout the plant, and the effect of coal and ash on the external parts, are matters which should be his responsibility. A lifeline of the turbine, its lubrication system, because of its oil, devolves on the chemist, and a vital link in transmission, the condition of switch and transformer oil, also his responsibility. Apart, therefore, from purely mechanical wear and tear, the responsibility of the chemist for the safety and efficient working of the plant is at least as considerable as any of his engineer colleagues, and he needs wide knowledge and experience to implement that responsibility.

For the efficient working of the industry under modern conditions, the B.E.A. should set increasing standards of qualification, competency and experience for their technical staff. It would seem, however, that in the case of the chemist they are prepared to accept a much lower standard of qualification, training and experience, and an inferior class of candidate, than other branches of industry will tolerate. They seem prepared to perpetuate to as great an extent some of the bad conditions obtaining in this respect prior to vesting day.

As a duty to the welfare of the industry, it is suggested that this very retrograde attitude should be reversed before more of these key positions are occupied by inferior personnel.

"Chemist"
B.Sc., A.R.I.C.

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Radiant Boiling Plates

IN view of the two most interesting articles in your edition of June 22 on "The Cooker Position" by a commercial officer and a manufacturer wherein both writers appeal for a lower priced cooker, Miss Clapperton's letter urging multiple control of the grill boiler as well as the boiling plates points towards at least one means of lowering costs. There would be a saving to both sides if only one form of control could be handled in place of two (or even three when a four-heat switch is offered in addition to a three-heat). The manufacturer would eventually save in production and the Boards on handling and stocking spares and parts. As Miss Clapperton points out, the multiple control on a grill-boiler has *every* advantage to the user.

With the flexibility of this form of control on the radiant plate and the grill-boiler there is little left to improve on the hob of the electric cooker.

It is a retrograde step to recommend solid plates, as Miss Gilbert states. *The user must be given flexibility of control "responsive" radiant plates and, as far as possible, tap-like control throughout.*

If low-priced cookers are seriously required, Miss Whitgift's suggestion of offering solid-type plates as well as radiant plates, three-heat switches, four-heat switches, and multiple control appears to be somewhat impractical.

In considering hob capacity of cookers, an electric kettle relieves the hob of a great deal of work, and no form of fuel can compare with the speed of a high-loaded kettle, therefore the one boiling plate, grill-boiler size cooker should be just as effective now as it was in pre-war days. That, in itself, should help to reduce the gap between the price of the gas cooker and the electric cooker for families of five to six people.

No doubt these points would be brought forward to the prospective user by all concerned.

Ester Purvis

LONDON, E.C.1.

World Power

Developments in Steam Plant, Gas Turbines and Atomic Energy, discussed in last week's session of the Fourth World Power Conference

LAST week we summarised some of the papers which had been prepared for the Fourth World Power Conference. Now we are able to continue our report of the proceedings with notes on some of the other papers read and with details of the discussions held during the technical sessions. Often there were three separate meetings continuing at one time, and full report of all the points raised could not be obtained, but the discussions on most of the papers of electrical engineering interest are included below.

Steam Turbines

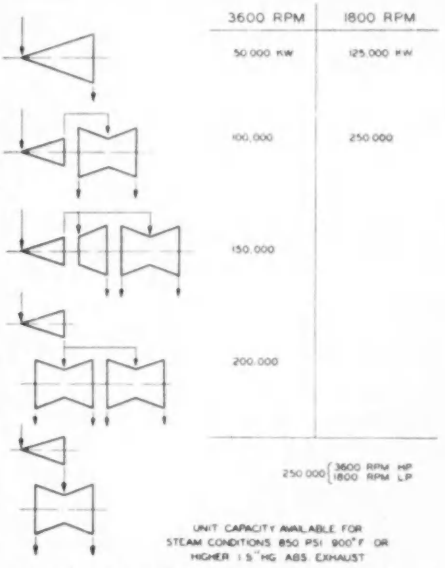
Thursday morning's session on steam turbines and auxiliaries, which was held under the able chairmanship of Dr. W. BORGQUIST (Sweden) produced one of the best discussions heard at the Conference. Nine papers were considered, four of them dealing with trends in large turbine design (F. DOLLIN, G.B.; E. E. PARKER and C. B. CAMPBELL, U.S., and C. SEIPPEL, Switzerland) and others with operating experience (P. W. THOMPSON, U.S.), mercury turbines (H. W. HACKETT, U.S.), cooling towers (J. C. T. MULDER, Netherlands), air condensing (Dr. L. HELLER), and the driving of auxiliaries (F. FLATT, Zurich).

All the "trend" authors deal with the progress towards higher steam temperatures and pressures, Some U.S. plants are operating at 1,800 and 2,000 lb/sq in., and several are working at 1,050° F., steam conditions 1,500 lb/sq in. and 1,050° F. are mentioned for British 60 MW and 100 MW sets as well. The Americans forecast an advance to 1,100° F., 2,200 lb/sq in. Attention is called to the manner in which the last row of blades determines the maximum output obtainable from a turbine, and the limiting blading in the U.S. is put at 23 in. high at 3,600 r.p.m., mounted on a disc of 65·5 in. pitch diameter, so that the tip speed is 1,395 ft/sec. All the authors deal with twisted blading and SEIPPEL discusses vortex blading in some detail.

Wetness of steam is considered by DOLLIN and SEIPPEL, the latter recommending a system of ducts and orifices to withdraw up to 50% of the water. Reheat is a subject common to all the papers, and it is agreed that it results in the same effect as could be obtained from raising the initial steam temperature by 130 to 150° F. Considerable attention was devoted to the special alloy steels needed for high temperatures, and this interest was reflected in the discussion. THOMPSON's paper on operation also deals with materials; this author gives top turbine availability as 94%, with boilers at 90%, excluding the varied load demand during week-ends and holidays.

Discussion

Opening the discussion, Mr. C. W. CLARKE (U.S.) dealt with large turbines running in the U.S., stating that six were operating at 1,050° F., with pressures up to 2,000 lb/sq in. Mr. W. B. SHANNON (G.B., B.E.A.) commented on methods of avoiding graphitisation of alloy steels: in Great Britain the use of aluminium as a deoxidant for ½% Mo steel had been avoided, and the carbon content carefully controlled. From the U.S. evidence this appeared to be the right approach. The upper limit for ½% Mo steel without chromium was reckoned at 950° F. Austenitic steels had



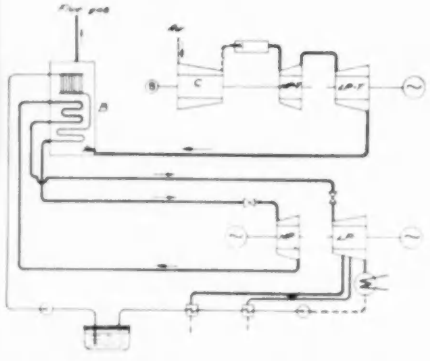
Capability limits for customary arrangements of turbine elements in the United States

considerable possibilities, and could be welded.

Mr. R. RATH (France) queried whether stellite shields had actually been used on last stage blading to protect against erosion. He thought that distortion and cracking would follow attempts to weld it on. Turning to corrosion troubles, he asked for the thorough cleaning out of steam piping and boilers before the initial starting up of plant, this to be the responsibility of the erectors.

Mr. O. A. WIBERG (Sweden) emphasised the need for quick starting plant, and said that in Sweden a 65 MW Ljungstrom double rotation set had run up from cold in 8 minutes. At present work was proceeding on a 100 MW set. He thought starting time would be an important factor in the competition between gas and steam turbines. Mr. J. W. FIELD (G.B., B.E.A.) considered that the advance in Rankine cycle steam temperatures might well be uneconomic, because of the necessary change from ferritic to austenitic steels. He advocated the use of his recently proposed gas-turbine-steam cycle as an alternative and quoted as a possible example the installation of two 93 MW sets as topping turbines at Hams Hall, putting the cost of this additional power at £25/kW. For a proved rear end configuration 300 MW sets would be practicable on the Field cycle.

Dr. G. LEVI (Israel) considered that the minimum interval between inspections of turbines should be three years, and he had found that four to five years was safe. The minimum outage time for an inspection was 8 days. H. S. HVISTENDAHL (G.B., Brush) considered standardisation, and pointed out that with the 20% speed difference between British and American sets the slower machines were better towards the exhaust end and the American sets at the h.p. end. Thus, given standard pressure and temperature steps, it might be best for 50 c/s countries always to be one step below U.S. conditions for a corresponding machine.



Swedish scheme for a combined steam/gas turbine plant

HP-T High pressure gas turbine. LP-T low-pressure gas turbine HP High pressure steam turbine. LP Low pressure steam turbine C Compressor B Boiler S Starter

Authors

At this stage the Chairman invited the Authors to join the discussion. Mr. C. B. CAMPBELL cautioned against optimistic expectations of a 1,200° F. cycle: austenitic steels were used with considerable hesitation at 1,050° F. because of their low conductivity and high coefficient of expansion. Mr. F. DOLLIN answered Mr. RATH'S query by saying that blades on which stellite was welded did tend to deform. Quoting his firm's experience with entrained steam beyond the governor valve, he thought a considerable amount could be tolerated without trouble. Mr. E. E. PARKER pleaded for more attention to the reheat cycle. Two 1,050° F. sets were being built with specially developed ferritic steels, but 1,200° F. would need austenitic. The main steam piping was not of austenitic material.

Boilers

On Thursday afternoon, the Conference met under the chairmanship of MR. J. F. THIBAULD to discuss eleven papers dealing with steam generation. Four of these dealt in general with trends in boiler design, the authors being W. F. SIMONSON (G.B., W.T.B.A.), W. H. ARMACOST (U.S.), W. H. ROWLAND (U.S.) and R. BEDUWE and J. BOSSAERT (Belgium). Four more papers dealt with designs for burning special low-grade fuels, while the remaining three had as their subject marine boilers, locomotive conversion and combined gas and steam turbine plants. This last paper was contributed by O. A. WIBERG and C. R. NICOLIN of Sweden.

The four general papers all devote much space to the description of current construction. SIMONSON notes the use of the spreader stoker with grit refiring in sizes up to 240 klb/hr, while ARMACOST describes tilting burners for p.f. firing as a method of superheat temperature control. The spreader stoker and the cyclone furnace are discussed by ROWLAND, who also speaks of units of 1,370 klb/hr capacity and efficiencies of nearly 90%.

WIBERG and NICOLIN discuss a gas turbine placed before a steam boiler, the turbine exhaust heat being fed to the boiler, giving 95% efficiency for the gas turbine. A low temperature economiser is used to keep the stack tempera-

ture low, bleed-steam heating being omitted. Overall efficiencies of 40 to 45% can be expected for such plant with the gas and steam temperatures now in use.

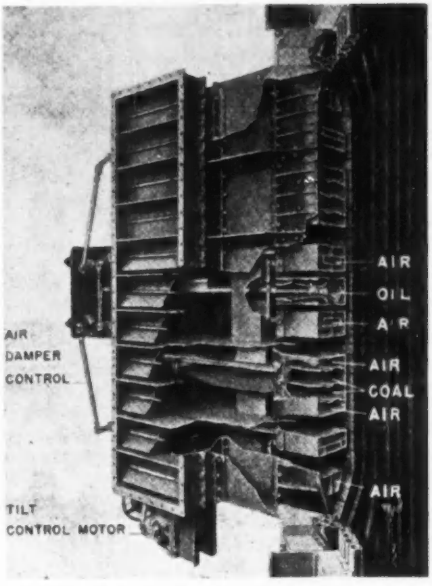
Discussion

As in the morning session, there was considerable concern with high temperature materials during the discussion, and DR. F. MUENZINGER (Germany) pointed out that with 1050° F operation one square foot of superheater surface was more expensive than the same surface of reheater, due to the incorporation of austenitic steels. To increase the useful area, he proposed the use of the suspended type superheater with parallel walled tubes. DR. E. G. RITCHIE (G.B., B.C.U.R.A.) considered the coal problem, and dealt especially with the way in which wetting a coal could improve its combustion if it contained fines below ⅛ in. diameter; 1 to 2% of surface water was needed for each 10% fines coming in this category. Dealing with the ash and deposit problem, he considered that it was cheaper to clean the coal at the colliery than to pass the problem on to the combustion engineer.

LT.-COL. E. H. E. WOODWARD (G.B., B.E.A.) emphasised the difficulty of designing boilers to run on variable fuels. He advocated a price structure for coals, taking into account both their heat release and the ash disposal trouble associated with them. DR. H. E. CROSSLEY (G.B., B.E.A.) also had strong views on coal uniformity, and said that running a boiler on a single coal had immediately given an efficiency of from 2 to 3% better than when a variable supply was used. He thought that sodium, potassium and lithium were the cause of many bonded deposit troubles in boilers. One boiler ran for 8,200 hours without blocking on an alkali free fuel, for 1,200 hours with a coal containing 0·2% of alkali oxide and for only 520 hours with a 1% alkali oxide coal.

G. A. PLUMMER (G.B., John Thompson) pointed out that full standardisation of boiler plant could only be achieved if a standard fuel were available. We were a long way from that in this country. However, the international standardisation of boiler regulations would help designers. Speaking of gas turbines, MR. W. KARRER thought that they would not replace steam units in sizes above 15 MW for some years, but in combination with them, they would help to give higher output.

MR. R. Ll. REES (G.B., B.E.A.) spoke of corrosion troubles on the water side of boilers and also of intercrystalline degradation of the high pressure tubes, which gave little warning. MR. C. E. WILWERTZ spoke of five groups of



Typical burner for corner firing

1,100 lb/sq in. working in Belgium, and said that availability seemed good in spite of the low grade fuel in use. DR. R. G. QUACK (Sweden) emphasised the need for a machine to fill the gap between the internal combustion engine and the steam engine.

MR. F. B. KARTHAUSER (G.B., N.C.B.) considered the use of middlings and slurries from coal washery plants, saying that they must be applied to power production if coal cleaning was to be economic. DR. A. A. TAYLOR (G.B., B.E.A.) thought that coal prices could be based on ash content and calorific value. He said that at present, it was not economical to burn low-grade fuels, and information from Europe tended to confirm this.

Gas Turbines

Five of the papers discussed at Friday morning's technical session on gas turbines and jet engines were of direct interest to electrical engineers. Coming from Switzerland (Dr. C. KELLER, of Escher Wyss Ltd., and Mr. W. KARRER, Oerlikon), the United States (Messrs. L. N. ROWLEY and B. A. SKROTZKI), France (Prof. M. ROY), and Great Britain (Dr. D. M. SMITH, Metropolitan Vickers), they gave a wide review of the development of this type of prime mover. As Dr. H. ROXBEE COX, general reporter for the session, pointed out, two features are particularly noticeable from the papers;

the overwhelming appeal to engineers of the open cycle and the concentration on the axial flow compressor in preference to the centrifugal design.

Mr. M. E. BARTHALON (France) opened the discussion with some remarks on a free piston compression system giving 54 lb/sq in. at full load. A prototype model of 250 h.p. rating had run 3,500 hours on test, including 100 hours on a heavy fuel. Sets are being built of 1·7 MW rating for a works, with another of 1·25/1·4 MW rating for Electricite de France. Dr. A. T. BOWDEN (G.B., Parsons) pointed out that a margin was likely to exist between design expectations and practical achievement. For steam turbines and traditional forms of internal-combustion engine this was known; for gas turbines, not. Simplicity as a feature of the gas turbine was only likely to be found in small open-cycle units. He considered that since industrial applications hung back behind design progress it would not for many years be worth while for manufacturers to lay down the specialised machinery needed to manufacture blading at a cheap rate. The necessary use of austenitic steels further complicated matters.

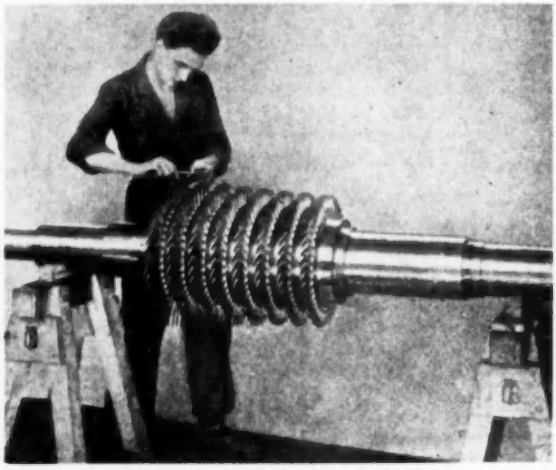
Prof. H. MELAN (Austria) saw a future for the use of gas turbines in connection with the gasification of Austrian brown coal. Prof. W. J. WALKER (S. Africa) referred to thermodynamical calculations which he had made and concluded that for large power station applications the closed cycle was more attractive than the open, especially if air heater development permitted higher temperatures to be used. Prof. V. RUBBO (Italy) said that the use of natural gas in gas turbines, where available, allowed an escape from the problem of corrosive oxides: in Italy natural gases did not contain sulphur. He asked for an international code of symbols and nomenclature for gas turbine work.

Dr. G. LEVI (Israel) described his experience with gas turbines working since 1935 in conjunction with oil-fired Velox boilers. Blade deposits were water soluble, but when at one time Bunker C oil containing 3% sulphur had to be used it was necessary to remove deposits with a hammer and chisel. There was a 2 mm thick deposit after 1,500 operating hours. Undercutting of the turbine blading was observed at the end where dust and slag were centrifuged out. Mr. J. F. FIELD (G.B., B.E.A.) again discussed his proposed combined cycle, and gave further details of his scheme for Hams Hall A. With 1,200° F. gas cycle sets each operating at 95 MW he estimated coal saving at 325,000 tons/year; a yearly saving of £900,000 for a cost of £3 to £4 million.

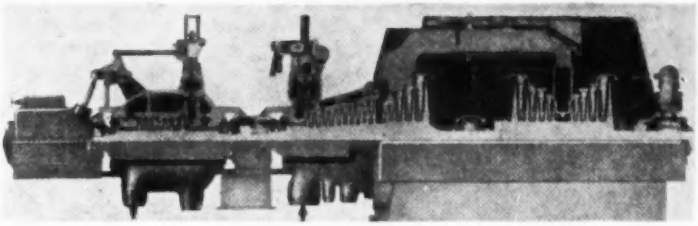
At this stage the Chairman, Mr. C. SEIPPEL (Switzerland) invited the authors to join in the discussion. Mr. W. KARRER pointed out that half the combustion heat was wasted in the exhaust; an industrial user of low-grade heat was needed to give full efficiency. He also remarked on the parallel between the steam cycle topped with a gas turbine and the mercury cycle.

DR. D. M. SMITH said that in the closed cycle the maximum temperature of the materials used had to exceed the maximum temperature of the working medium: in the open cycle they could be lower. Since high-temperature metals were so very expensive and difficult to handle, this commended the open cycle. Referring to MR. FIELD'S contribution, he said that he considered the pressure drops allowed in his calculations as too low for an economical construction; he did not think the efficiencies quoted by Mr. Field could be obtained for £30/kW.

Dealing with axial flow and centrifugal compressors, he pointed out that the former was the more expensive in small sizes, because the same number of blades was always needed for a given performance.



Working on the rotor of a high pressure gas turbine for a 12.5 MW Swiss plant



110 MW tandem compound 3600 r.p.m. reheat turbine

Atomic Energy

As was to be expected, a very large audience gathered for the last technical session of the conference, which considered atomic energy. MR. E. MERCIER (France), a most able chairman, declared the session open, and after the general report called upon SIR HAROLD HARTLEY to make a statement. Sir Harold said that the executive of the conference had decided that a useful discussion on the subject might be possible at this date; a unique opportunity existed, despite the difficulties of official secrecy. He hoped that the conference would be able to distinguish between what could be done "at any cost" and what was possible at an economic cost. He suggested that it would be a tragedy if concentration on nuclear power delayed the development of more normal types of energy.

The papers to be discussed had come from Great Britain, France, the United States, Canada and Sweden. The three authors giving a general approach all concluded that initial plants were likely to be dual circuit systems.

DR. D. A. KEYS the author of the Canadian paper, thought that much further work was necessary to determine the effect of a high neutron flux on the physical construction of solid materials. DR. L. KOWARSKI, who had contributed the French paper as Scientific Director of the Atomic Energy Commission, pointed out that much work by many experts was necessary for further developments, and that the progress made in any country not highly industrialised was a political subject. The limited French effort was given over to fundamental research and to training of personnel.

DR. BUNNEMAN (G.B.) took up the subject of breeding which had been raised in DR. R. LILJEBLAD'S paper from Sweden, and the two had a technical discussion. Briefly, Dr. Bunneman considered as pessimistic Dr. Liljeblad's calculations of the position when 1 : 1 return of radio-active material in the pile was not obtained.

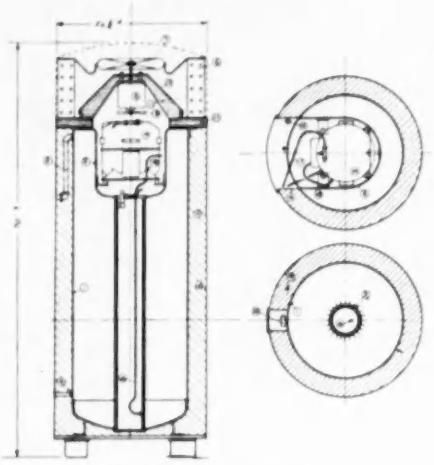
PROF. GOLUBSTOV (U.S.S.R.) noted with satisfaction the Canadian proposals for the peaceful use of atomic energy, but attacked MR. W. F. DAVIDSON'S (U.S.) remark, on the economics of nuclear power production that "if, as seems not unlikely, nuclear power plants are built as part of a multi-purpose development, then the allocation of common costs, which is to some extent quite arbitrary, may alter the situation." This he considered as equivalent to saying that nuclear power could not be economic in the absence of the atom bomb. Atomic energy in Russia was used for such purposes as blowing up mountains and obstacles for large-scale irrigation work.

The chairman in a warmly welcomed statement in defence of MR. DAVIDSON, said that the Russians had misinterpreted his views.

SIR JOHN COCKCROFT (G.B., A.E.R.E., Harwell) emphasised that we were only at the stage of building pilot plants to determine how full-scale plants might be operated. Details of a binary cooling system depended on metallurgical advances. Uranium was about as abundant in the earth's crust as copper, but was very widely dispersed, and the process of upgrading it into usuable form had to be solved. He agreed with Sir Harold Hartley about the need to avoid delaying development of other energy sources.

PROF. F. E. SIMON (G.B., Oxford University) was doubtful if all the schemes started in nuclear physics had their necessary share of

Sir Harold Hartley addressing the opening session Mr. Kenneth Younger is on his right



Heat pump water heater

1. *Tank shell*
2. *Top tank head and compressor pocket*
3. *Condenser*
4. *Cold water supply connexions*
5. *Heated water connexions*
6. *Refrigerant heat pickup coil*
7. *Main air circulating fan*
8. *Fan motor*
9. *Secondary air circulating fan*
10. *Thermostat*
11. *Insulation*
12. *Jacket side wrapper*
13. *Compressor housing cover*
14. *Refrigerant compressor (hermetic type)*
15. *Condensate drain line*
16. *Refrigerant liquid line*
17. *Refrigerant suction line*
18. *Refrigerant discharge line*

men with first-class brains; it was a mistake to have competition between the Universities and Harwell. Too many men had, in any case, been taken from the study of other forms of energy. MR. P. H. CHASE (U.S.) thought, on the other hand, that nuclear research deserved more manpower. He supported the remarks made by the chairman in rebuttal of the Russian delegates.

Earlier Discussions

Tuesday morning's papers at the Institution of Civil Engineers, which were reported on page 47 of last week's issue, produced only a short discussion, which was opened by MISS M. V. GRIFFITH (G.B., E.R.A.), who gave an account of the work on heat pumps which was being conducted by the E.R.A. Apart from experimental work on the machines, a study of the possible sources of low-grade heat is being conducted. MR. T. G. N. HALDANE (G.B., Merz and McLellan) saw the heat pump problem as now mainly one of economics, and particularly recommended a combined heat pump-domestic water heater construction. MR. P. SPORN (U.S.A.) agreed with this statement, and went on to emphasise the fuel conservation advantages of the heat pump.

Turning to wind power, MR. F. CHAPLIN (G.B., Enfield Cables) gave details of a 100 kW wind turbine, while MR. HALDANE prophesied that this source of energy might give as much output in Great Britain as hydro-electric schemes. Fuel economy, not firm kW, was the object in view. On volcanic steam, MR. VERGILLI, who spoke for DR. G. B. SANTI (Italy), said that almost 6% of Italy's energy came from this source. It was difficult to locate suitable steam, and when found a steady load demand was needed for efficient operation. MR. A. CAQUOT (France) carried the subject further by referring to the heat energy stored below ground, and envisaged artificial steam production on the Italian model by pumping water into the ground at a great depth and using the resultant steam.

Steam Generating Stations

The eight papers presented at the Institute of Civil Engineers on Wednesday morning attracted more attention, and Mr. E. E. PARKER (U.S.) led off, pointing out that U.S. steam temperatures had been increasing for some time by an average of 12° F/year. Use of the reheat cycle was widespread. He advocated more combined heat-electric stations because of their fuel conservation characteristics. PROF. R. P. L. GIBRAT (France) spoke of the use of coal containing 50% ash at French collieries. A mixture of three parts water to one of coal is to be pumped from the mine to the power station, and extensions are planned to thoroughly test this system. The cyclone boiler is to be tried out as a solution to the ash disposal problem.

British conditions were stated by MR. R. H. COATES (G.B., B.E.A.), who said that at present the cost of bringing coal 400 miles by collier is the same as that of taking it 30 miles by rail. However, good coal as well as bad must be burnt for electric power generation, and with high grade coal the economics would be greatly altered. So far as plant design was concerned, he emphasised that with the big range of plant efficiency existing in Great Britain, 1% increase in availability was worth 1% increase in efficiency.

DR. F. MUENZINGER (Germany) compared the Rankine cycle, the Field cycle, and the Ackeret-Keller cycle on the basis of the materials involved, and concluded that for a 100 MW set the Rankine would be the most economical in first cost. He did not think

it would be challenged for large steam power station operation during the next ten years. Another German delegate, PROF. A. RACHEL, spoke of brown coal station design, while MR. WAKEFIELD ADAM (G.B.) proposed the integration of coal gas production and electric power stations.

Referring to the South African paper, DR. VAN BERCKEL (Netherlands) gave details of tests in Holland on cooling towers having reinforced concrete louvres in one case and wooden louvres in another. Although the wooden louvres are very slightly more efficient when new, they deteriorate and sag, so lowering their cooling effect, whereas the concrete structure lasts better.

Mr. J. RICARD (France) gave details of French work on the siting of power stations relative to the position of coal and water resources. A station should only be placed somewhere between the pithead and the load centre when cooling towers are needed at the pithead, there is also a local h.v. distribution network which can be supplied. In connection with station design, he did not think that interconnection of unit boilers was worth while. MR. E. L. E. WHEATCROFT (G.B., Merz and McLellan) maintained that power station selection cannot be treated mathematically except as a check on ideas. Planned maintenance of plant is as important as accidental outages, and amounts to eight weeks every two years for turbines and six weeks every year plus a five-day cleaning period in between for p.f. fired boilers.

SIR JOHN HACKING (G.B., B.E.A.) concluded this discussion by speaking of the effect of cooling towers on the amenities question. Both the precipitation from the towers and the appearance of them seems to give offence. Research has shown promising ways of overcoming the first problem, but the second might force the B.E.A. to adopt forced circulation type plant.

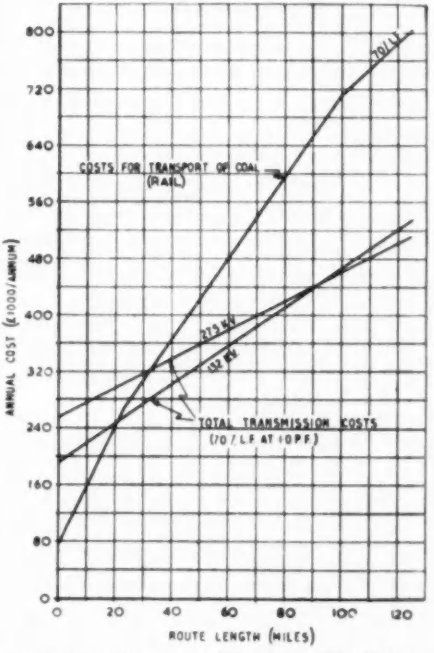
Hydro-electric Stations

Sweden opened the discussion at the I.E.E. on Wednesday in the person of DR. W. BORGQUIST, who considers that water power development is increasing faster than had been expected because of the favourable cost compared with steam stations—£30 to £40/kW installed in Sweden, including transformation up to 240 or 380 kV. The normal Swedish layout has the station near the dam and a tunnelless tail race: experience shows that large sets (100 MW) are economic. British experience in station layout was described by MR. P. L. BLACKSTONE (G.B.: Merz and McLellan), who spoke of keeping the upper floor of vertical turbine stations clear, and of using the unit auxiliary system, with battery operated standby plant used during starting.

Other British speakers were MR. E. M. JOHNSON (M.V.), MR. P. SCOTT (Sir Wm. Halcrow and Partners) and MR. H. HEADLAND (Kennedy and Donkin). Mr. Johnson spoke of the use of closed system cooling on vertical machines for underground stations, this depending on the use of several small passages for air delivery. Mr. Scott considered that the North of Scotland schemes were distinguished by the use made of every possible cusec of flow, even when this meant transferring water from one watershed to another. He considered earth dams cheaper for low heights, but preferred buttress construction for higher structures.

Mr. Headland considered that the extra cost of a Kaplan type runner above a fixed blade design was usually justified. He advocated the use of the electric calculating machines to investigate the increasingly important problem of waterhammer in pipes.

MR. L. CHALMEY (France) considered that



Comparison of costs of 132 kV and 275 kV transmission with costs of transport of coal by rail. Calculated for a 240 MW station for British conditions

small hydro-stations have many advantages: in this respect it is often possible to modernise old stations by fitting new, more efficient wheels. In France this could result in a 1,000 MW increase in capacity at half the cost of providing new stations. Another Frenchman, MR. R. LEFOULON, dealt with the varying rates of tunnel driving found in practice. MR. E. G. WESTERBERG (Sweden) pleaded for the installation of settlement and tension recorders in all large dams.

MR. M. R. ROUSSELLIER (France) explained that in his paper he did not mean to imply that technical development had reached its limit in all branches of hydro-electric work. Moreover, his remarks applied especially to Europe. He noted that in France, the size of catchment areas was limited by international frontiers.

B.E.A.M.A. Entertains W.P.C. Delegates

FUTURE developments in the power field for the benefit of mankind will come most rapidly through the greatest co-operation in research between scientists and in standardisation and application by engineers of all countries. So said SIR GEORGE NELSON, President of B.E.A.M.A., when he proposed the toast of "The World Power Conference" at a dinner given last week by the Association to delegates to the Conference. Earlier, in welcoming the delegates, Sir George had recalled that the original suggestion for the Conference was made 26 years ago by Mr. Dunlop, then Director of B.E.A.M.A.: he read a telegram received from the chairman of that year, Mr. Morcom, telling how the idea arose from the prominence of engineers at the Wembley Exhibition.

SIR HAROLD HARTLEY, K.C.V.O., C.B.E., M.C., F.R.S., responded to the toast with a typically witty speech. He added his tribute to Dunlop's vision, and then went on to warn that optimism about the prospects of nuclear energy must not interfere with immediate schemes of development of energy more immediately available. He thought that the time when nuclear power would economically supplement present resources was in the uncertain future.

Only one part in 50,000 of the solar energy reaching the earth was used, and if some part of the work being devoted to nuclear energy were deflected to investigating ways of using this heat from the sun, valuable results might be obtained. Energy was misused by man, and the only solution to this problem was the greater understanding of the unity of interest of nations.

MR. G. L. WATES, J.P., Chairman of the Council of B.E.A.M.A., proposed the toast of "The Guests," who emphasised the importance of electricity in the list of energy sources. A World Power Conference, said Mr. Wates, was "like a Grid system of brainwaves," the discussion sessions being reinforced by the friendships made and renewed.

The RT. HON. R. STRAUSS, P.C., M.P., Minister of Supply, responded first to Mr. Wates, stating his belief that in the electrical industry the pioneering spirit was as alive today as in the past. He thanked the industry for the help it had given to the Government in carrying through their plans. The Conference was undoubtedly valuable in allowing engineers to find out what were their common problems throughout the world. Nothing was more important than to assure people in democratic countries that an improving standard of living could be achieved under that system of life. The more power there was, the better off the people.

MR. ERNEST MERCIER, Vice-President of the W.P.C. International Executive, also responded, speaking first in English and then in French.

Lady Citrine, the Dowager Lady Swaythling and Dame Caroline Haslett at the E.A.W. World Power Reception

Problems and Practice

IN ENGINEERING

Neon Test Lamps

ALTHOUGH small and convenient to carry, the use of neon lamps for testing can be misleading. The following story illustrates how a simple fault took an unnecessarily long time to locate. A 3-phase welding plant was reported defective. The plant was protected by a 60-amp triple-pole switch and fuses with flexible lead to an isolator on the transformer. A neon test lamp clearly showed the supply to be reaching the isolator and the next step was to remove the top cover of the transformer. In order to check the internal connections, it was necessary to drain off several gallons of oil. The connections were in order and there was nothing for it but to start again. This time, however, a normal filament lamp was used, which proved one phase to be out. A closer inspection of the fuse carrier readily solved the mystery, the fuse had blown but the deposit left was an adequate path for the neon tester.

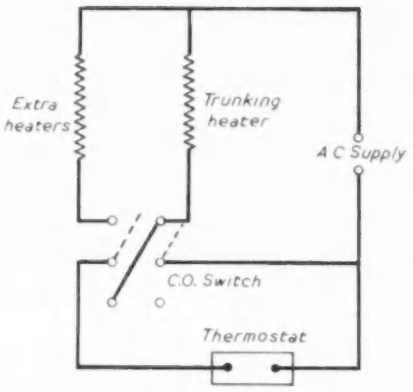
The fuse was repaired, the oil replaced and the plant quickly rendered serviceable.

Fortunately the consumer was so relieved at having his welder in operation again after fearing the worst, that he omitted to ask the question—"What was wrong?"—*S. Arnold.*

Restricted Thermostat Control

AT my place of employment we have two sterile rooms. These rooms are air conditioned by a small plant, filtered air being supplied by one fan through a separate trunking to each room. Warm air is obtained by electric heaters fitted in each trunk and controlled by thermostat fitted in each room. During normal weather this plant is quite capable of doing its job, which is supplying fresh air and maintaining the room temperature at a desired level. On very cold days it was discovered that the required temperature could not be maintained. It was not a practical proposition to increase the size of the heaters without major alterations to the trunking so it was decided to install tubular electric heaters in the rooms. Bearing in mind that this additional heating was in the nature of a boost and would only be required on very cold days the following scheme of control was adopted.

A double-pole changeover switch was fixed in each room and wired so that in one position the plant functioned normally. By putting the switch in the alternative position, the additional



Fuse protection is included in each heater circuit

Extra heat without thermostat complications

heaters were brought into circuit and the thermostat switched into this circuit so that it controlled the extra heaters, the trunking heaters being on continuously. This scheme has operated satisfactorily for the past two years and has the merits of leaving the original installation practically unaltered. The accompanying diagram should make it quite clear.—*T. Thomson.*

Slipping Windings

WE had completed a changeover from d.c. to a.c., and a noise was being heard from a 3-phase squirrel cage sprocket-drive motor, which pointed to a faulty sprocket. The motor would run for a short time and then "miss" for a few seconds.

The guards, with over fifty pins and nuts, were removed to inspect the faulty gears, but these were found to be in perfect order.

Upon running the motor in this condition it was noted that occasionally the motor sprocket stopped for a second or two and then started again, this causing the noise reported.

Further investigation proved that the rotor windings continued to revolve when the shaft was stationary, but through the heat generated "made contact" again.

The motor was taken out and returned to the manufacturers, who informed us that the rotor windings were fitted hydraulically to a splined shaft, and this was the first complaint that had been reported to them.—*R.S.M.*

Two-Phase Lighting Fault

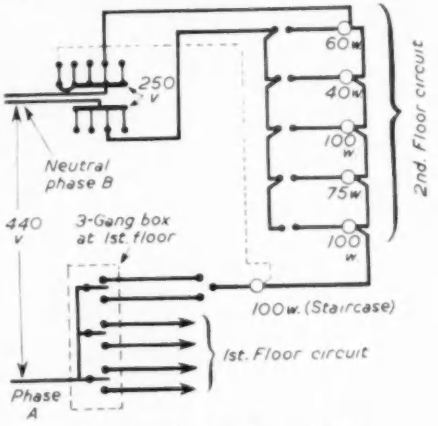
RECENTLY, a rather curious fault developed on a lighting circuit in a three-storey factory welfare block. The installation had been carried out in concealed conduit and flush switches, the supply being 440 V 3 phase and neutral, with a separate single-phase main for each floor. The fault was on a second floor circuit, which apparently contained a number of room lighting points controlled by local, switches, and a light on the staircase connecting the first and second floors. This staircase light was controlled by the usual two-way switches on the staircase.

The fault itself was the peculiar behaviour of some lights, which were sometimes normal, sometimes very dim, and sometimes very brilliant. For instance, when I arrived the staircase 100-W lamp was practically out, and a single 40-W lamp was very bright, indicating a high voltage at the second lamp. As I switched on more lights, the 100-W lamp grew brighter, but the other lamps grew more dim until, when the whole circuit was in use, the staircase 100-W was extra bright and the remaining lamps were hardly glowing.

This seemed to show the characteristics of an insulation leakage and the next step was to examine the circuit fuses, which being done revealed a blown negative fuse. Thoughtlessly, I replaced the reloaded fuse before making a Megger test and was surprised to find that all the lamps on the circuit were now working normally, irrespective of the number in use. Withdrawal of the negative fuse alone cause the fault to reappear, but on investigating further I found that with the positive fuse alone withdrawn, all circuit lights were extinguished with the exception of the staircase light, which functioned normally. Altogether an awkward situation at first sight.

However, after a check of the wiring system, I discovered that the staircase light was fed at the first-floor switch by phase A, and looped for return to the second-floor circuit. I assumed that the original intention had been to include the stair point on this circuit, but that this scheme had been abandoned as it would have necessitated the presence of two phases in one switch box on the first floor. Therefore, since all neutrals were at the same potential, the present arrangement had been used, which was quite a workable idea, although not good practice.

From the diagram it can be seen that when the common neutral fuse is out, the staircase light could obtain a return path through any lamp on the second floor circuit by means of its associated switch to phase B. Thus we would now have two groups of lamps in series across 440 V, so that if a 100-W lamp was switched on with the staircase 100 W the voltage distribution would be 440/2=220 V per lamp and no change would be noticed. With a 40 W lamp in series, the distribution would be approximately 314 and 126 V respectively, so that whereas the 100 W lamp would be dim, the 40-W lamp would be brilliant. Lastly, if the full second-floor circuit was in series with the staircase lamp, the distribution would be approximately 92 and 348 V respectively, so



Circuit on the two floors as found

that the 100-W stair lamp would be brilliant and probably burn out. To all intents the remaining lamps would be out, with such a low terminal voltage.

So it can be seen, that in such a situation any increase in the wattage of the second-floor circuit would further increase the voltage at the staircase lamp, in the event of the negative fuse blowing again. This could easily lead to a short circuit between phases A and B, and therefore a separate return cable was fed back from the staircase point to a separate negative fuse on the second-floor fuseboard as shown dotted. Any other arrangement was impossible owing to the nature of the conduits.—*J. T. R.*

Longest Co-ax Cable Laid

New Post Office link between England and Denmark

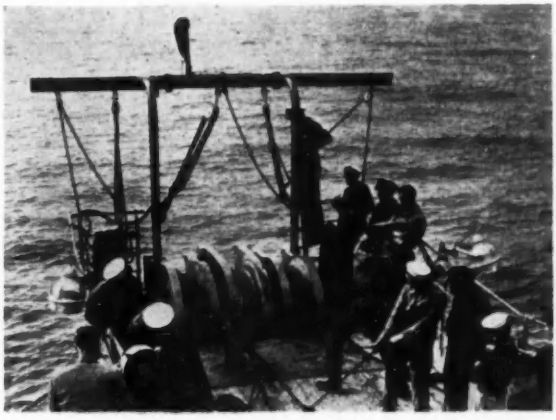
THE laying of the longest coaxial submarine telephone cable has recently been completed by H.M. Telegraph Ship *Monarch*. This cable runs between Weybourne (Norfolk) and the Island of Fano, off the west coast of Denmark. Contractors for the cable are Submarine Cables Ltd., the telegraph terminal and repeater equipment being supplied by Siemens Bros. and Co., Ltd. Initially only nine simultaneous teleprinter circuits will be used, but when telegraph repeater equipment is installed at the cable terminals only, this will be increased to fifteen, and at a later date, when the performance of the cable has been completely assessed, a submarine repeater will be installed to bring the number of simultaneous channels up to thirty-six.

Making the final splice of the Anglo-Danish Cable

Cable Construction

The cable is of the type which has been used extensively by the Post Office for continental telephone traffic since 1945. The central conductor comprises a single copper wire surrounded by thin copper tapes, the diameter of the combination being 0·17 in. This is insulated to a diameter of 0·62 in. with Telcothene. An outer conductor comprising six long-lay copper tapes is formed directly on the surface of the dielectric to provide a path of low resistance for the carrier frequencies to be transmitted. These six tapes are held in position by a short-lay copper binding tape, and the core is then served with tarred jute and armoured with twelve No. 2 (0·276 in.) galvanised iron wires. An outer serving of tarred jute completes the cable, which has an overall diameter of 1·75 in. and weighs nearly 10 tons per nautical mile.

For 500 fathoms seaward from each terminal station, the outer conductor is insulated before being served, with telcothene of radial thickness 0·10 in. This enables any extraneous currents which may be induced in the outer conductor near the shore, to be controlled and minimised, and, as an added precaution against interference, a lead sheath is applied to the short lengths lying in trenches between low water mark and the cable stations. The number of armouring wires is increased to 14 in the "insulated outer" portion, and to 16 at the extreme ends where the lead sheath is used.



Cut the rope and slip the final splice

Characteristics

Laid length of the cable is 306 nautical miles, and the electrical characteristics per nautical mile at a temperature of 10° C are as follows: d.c. resistance (centre conductor), 2·21 ohms; capacitance, 0·185 microfarad; d.c. insulation, 2 x 10^6 megohms and attenuation, 0·34, 0·44, 0·52, 0·59 decibels at 5, 10, 15 and 20 kc/s respectively.

overseas news

Peat into Power

Mr. Daniel Morrisey, Eire Minister for Industry and Commerce, gave details to the Dail last week of a £12,520,000 scheme for peat bog development in seven counties in Eire to be carried out in the next ten years. Two million tons of peat fuel will then be produced per annum. Of this, he said, electricity production would take 900,000 tons.

Helsinki Changes Supply

During 1949, 5% of the supply to business premises and homes in Helsinki was changed over to 220 V, a.c., 50 c/s, from the present 125 and 127 V, d.c. supply. The work of standardisation is not expected to be completed until 1965.

New Egyptian Scheme

A new plan, which embodies not only the Aswan Dam hydro-electric scheme but also the iron-ore project and the fertiliser factory project in the same area, has now been drawn up by Osman Moharram Pasha, the Egyptian Minister of Public Works. Cost of the scheme is estimated at £E100 million, but expenditure will be distributed over a period of five years. The report is to be submitted to the Cabinet shortly and is based on advice provided by internationai experts. The capital is to be raised by national loans guaranteed by the Government. In addition, the Minister of Public Works is reported to be drawing up a scheme for reservoirs and the reclamation of land.

Greek Power Plan

The European Co-operation Administration (E.C.A.) has approved the expenditure of $10,005,000 for the establishment of a thermic power plant at Chalkis, the Greek Minister of Co-ordination, Mr. Tsonderos, has announced.

Victoria Plans Two Diesel Stations

About £1,500,000 is to be spent on the first two of a series of regional power stations in a plan to increase rural electricity supplies in Victoria. Two stations at Shepparton and Warrnambool will add 20,000 kW to the present supply system. Decentralisation of industry in the State has meant a greatly increased demand in some districts.

Work has already begun on the £778,000 Shepparton power station, and land for the Warrnambool site has been purchased. Work will begin there in a few weeks. The stations will have nine diesel sets, but with provision at Warrnambool for another three. Both will be in operation within twelve months. Features in the design include sound-absorbent roofs and concrete chambers to silence the air intakes.

No Cold Feet for Operators!

An unusual but effective floor-heating system has just been installed in the plant workshops of the Hydro-Electric Commission at Bronte Park, Tasmania.

Water raised to a temperature of approximately 170° F in a 200-gallon immersion type heating unit is circulated by means of an electrically-driven centrifugal pump through a series of pipes set in the concrete floor of the workshops. This raises the floor temperature to approximately 75° F and warms the atmosphere in the building.

Normally overhead radiators or air-conditioning are used for heating workshops. The new heating is claimed to be extremely efficient.

B.C. Expansion

Satisfactory progress is reported by the Maritime Electric Co. on the installation of the new 7,500 kW turbo-generator at the Charlottetown plant, Prince Edward Island. In addition to the usual city and rural maintenance, pole line replacements for highway work, etc., the company's construction programme includes a new pump house on the Hillsboro River, two power plant building extensions and additional switchgear. The company is also erecting 135 miles of pole line to connect some 600 new farm consumers.

Compensation Payment

British Columbia Power Commission has paid West Canadian Hydro-Electric Corporation $1,211,792 as a final settlement for expropriation of the company's properties in the Okanagan district. The payment is made under arbitration finding and brings the total to $3,289,700 paid to the West Canadian Hydro-Electric Corporation by the Commission. Other payments to be made shortly include $601,000 to Nanaimo-Duncan Utilities, Ltd., raising to $1,706,000 the amount paid from profits of properties on Vancouver Island, and $67,000 to the Columbia Power Company, making a total paid to that company of $227,000. Altogether the Commission has paid about $8 million for expropriating private electric operations. The Commission's total investment amounts to $40 million, the largest part being for commissions owned by Hydro-Electric undertakings.

Canadian Manufacture

New plant and equipment valued at $55 million were added to the Canadian electrical apparatus and supplies industry during the past four years, and a further $13 million will be spent in this way in 1950, according to the monthly commercial letter of the Canadian Bank of Commerce. The electrical industry is now the second largest manufacturing industry in Canada. It employs

two and a half times as many workers as in 1939, and the net value of the goods it produces is five times that of pre-war. This growth reflects war-time industrialisation, greater use of electricity by industry, farms and households, and deferred post-war consumer demand. Exports of electrical apparatus have also assumed greater importance. The greatest proportion of demand for electrical products arises from industrial expansion and extension and improvement of generating and transmission facilities. It is estimated that within the next two years 1·5 million h.p. will become available from projects now being built, while still further developments are being negotiated. Canada will be served by over 16 million h.p. of electricity by 1951. This is expected to rectify the shortages felt in Ontario and Quebec in 1948 and 1949, when demand for primary power increased faster than additions to generating capacity.

M.E.S.C. Compensation Talks

Directors of the Madras Electric Supply Corporation Ltd. and officers of the Government of Madras met last week at Madras to discuss possibilities of settling by negotiations certain differences over the amount of compensation still payable by the Government to the company in respect of their acquisition of the Corporation.

Although the Government have already paid Rs. 1·33 crores (about £997,500) towards the value of all the assets taken over, pending appraisal of the same by a firm of engineers agreed to by both parties, the firm have since valued the property acquired at about Rs. 2·39 crores (£1,782,500). It is now feared that in the event of the assessor's valuation not being acceptable to either party, the matter may have to be referred to arbitration.

Power from Geysers

New Zealand Cabinet has just approved expenditure of £80,000 on exploratory work to ascertain whether geo-thermal steam in Rotorua—in the heart of New Zealand's geyser land—can be harnessed for the generation of electric power and other industrial purposes. A task force of 60 men is now engaged on experimental work and the sinking of bores to tap the underground power.

Broadcasting in S.A.

Commercial radio stations are being set up by the South African Broadcasting Corporation throughout the Union and may be ready to go into operation at the main centres by next year, according to a recent report. In Durban, Port Elizabeth and Bloemfontein, the commercial transmitters are almost complete, while in Grahamstown and Maritzburg they should be ready next year. Cape Town's transmitter will follow shortly afterwards, and work is going on at Kimberley. No date has yet been set for the first broadcasts from commercial stations outside the Transvaal.

T.V. in America

By 1955 there will be over 28 million television sets in use in America, according to Mr. E. H. Vogel, manager of marketing for the American General Electric electronics department. New receivers will be added at an annual average rate of $5 million. During the period 1951-54, Mr. Vogel estimated 404 stations will be added to the 109 on the air in 1950. Of these 404 new stations, 310 will open 146 new areas and 94 will augment service in the present 59 television markets. It was estimated that 71% of all U.S. families will be served by two or more stations, offering simultaneously two or more network programmes, he said.

The 30-inch direct-view TV receiver recently exhibited by Allen B. Du Mont Laboratories Inc. is now in limited production and will be ready for delivery in September. The company, who have 17 models with screens varying from 17-30 inches, has also entered the lower-price market with a 17-inch table model costing 249·95 dollars.

RCA Victor have introduced 18 new TV models, all said to be substantially cheaper than earlier comparable instruments. The smallest is a 12½-inch picture-tube model priced at 159·95 dollars and the largest a 19-inch set with AM and FM radio which costs 695 dollars. This company, however, is laying most emphasis on 16-inch receivers, and 70% of its output will be devoted to them.

Puerto Rican H.-E. Scheme

The Puerto Rican Water Resources Authority is to spend more than eight million dollars on the construction of two dams and a power plant as part of a giant hydro-electric and irrigation programme.

A dam is to be built on the Toa Vaca River, nine miles above its confluence with the Jacaguas River, which will drain, with the aid of a small diversion dam, an area of almost nine square miles along the Bauta River north of the mountain range which divides the island. The large dam will create a reservoir of 2,240 acre/ft capacity. From this reservoir, the water will be conveyed through the divide between the Toa Vaca and Coama River watershed to a power plant to be located four miles upstream of the town of Coama. It will produce an estimated 14·9 million kWh annually.

Second part of the scheme calls for the construction of a dam three miles above Coama on the river of the same name. This dam will create a reservoir with a capacity of 1,900 acre/ft. It will regulate the run-off from ten square miles of drainage area and re-regulate the output from the power plant. From the dam, the water will be conveyed by means of gravity canals through an irrigation system, which will serve 4,800 acres of land on both sides of the Coama River. An additional area of some 2,600 acres could be irrigated by pumping if sufficient water could be made available.

PERSONALITIES

IN THE INDUSTRY

Sir John Greenly has expressed a desire to retire from the chairmanship of Babcock and Wilcox, Ltd. We understand that he will remain a member of the board. Sir John, who has a distinguished record in the engineering and metal industries, joined the board of Babcock and Wilcox in 1929 and has been chairman since 1937. His successor as chairman will be **Mr. W. Lionel Fraser,** who is deputy chairman of the banking house of Helbert, Wagg and Co. Mr. Fraser, upon his appointment to the chairmanship of Babcock and Wilcox, has resigned from the board of Tube Investments of which he was joint deputy chairman, he will, however, maintain a close and friendly association with the company. He remains chairman of Thomas Tilling, Ltd., and deputy chairman of the Atlas Assurance Co. Mr. Fraser is British censor of the State Bank of Morocco.

Mr. Peter Scott

Mr. W. L. Fraser

New publicity manager of the English Electric Co. Ltd. is **Mr. Peter Scott,** who took up his appointment on July 10. Mr. Scott was for the last five years sales and advertising manager of the Broadcast Relay Service organisation. His connection with advertising goes back to 1930, for although he joined Lever Brothers in 1927 and remained in that organisation until 1937, Mr. Scott was with "Lever House Advertising Service" when it was re-organised as Lintas, Ltd. Mr. Scott was also with Allied Newspapers, Manchester and with Thos. Hedley & Co.

Mr. J. F. Chaplin, formerly branch manager of the Birmingham office of Walsall Conduits Ltd., has been appointed district manager for the Birmingham, Worcestershire, Shropshire and North Staffordshire areas.

New station superintendent at the Chadderton station, N.W. Division of the B.E.A., is **Mr. C. B. Meadowcroft,** M.INST.F., who took up the appointment on July 1. Mr. Meadowcroft was educated at the Halton Bank Secondary School at Salford and later at the Royal Technical College, Salford, and the Manchester College of Technology. He

Mr. C. B. Meadowcroft

Mr. L. Sewell

served his apprenticeship with Salford Corporation Electricity Department, rising to acting charge engineer. He was subsequently junior charge engineer, charge engineer and assistant station superintendent with Oldham Corporation Electricity Dept. Mr. Meadowcroft takes an active interest in the activities of E.P.E.A. and was for a time their publicity secretary.

Formerly efficiency engineer at Greenhill and Chadderton stations, N.W. Division, **Mr. K. Ford,** A.M.I.E.E., has been appointed deputy station superintendent at Chadderton. Mr. Ford is also an associate of the Royal College of Technology and an associate member of the Institute of Fuel. He served his apprenticeship with Metropolitan Vickers. Following an appointment with the North Eastern Electricity Supply Co., he was with Nottingham Corporation. During 1946 and 1947 he was at Ferrybridge station of the Yorkshire Electric Power Co., then becoming charge engineer at Chadderton.

The third new appointment in the N.W. Division is that of **Mr. L. Sewell,** who is promoted from deputy to station superintendent at the Greenhill generating station.

After an apprenticeship with the Rosedale Engineering Co., Mr. Sewell joined in 1907 the Mexborough and Swinton Tramway Company. After a period with the firm of John Brown colliery electrical engineers, he went to Morecambe as switchboard attendant, and was at the old St. James Street power station. Later Mr. Sewell was appointed shift charge engineer at Barrow-in-Furness, where he remained six years. He then left the public supply industry to take up a post as senior engineer in the power station owned by and supplying Lochar Ltd., of Dumfries.

In 1920 Mr. Sewell assumed the post of charge engineer at Oldham, in which he remained until his appointment as deputy power station superintendent on Vesting Day, 1948.

Mr. C. Pitt has resigned his directorship of Veritys, Ltd., and is no longer connected with the management.

Mr. J. J. Gracie, C.B.E., Manager of the Witton works, hands the album to Mr. Cranston

Having served over forty years with the General Electric Co. Ltd., **Mr. W. W. Cranston,** manager of the fan and f.h.p. motor department at Witton, has just retired.

Mr. Cranston joined the machine design department of the company in 1910 and ten years later he became assistant to the chief draughtsman of the engineering drawing office.

In 1933 a separate department to handle fans and fractional h.p. motors was created, Mr. Cranston being appointed technical manager.

At a luncheon in his honour at the Magnet Club, Witton, Mr. Cranston was presented with a cheque and an autograph album containing the signature of his many friends and colleagues. We join them in wishing Mr. Cranston many years of happy retirement.

Friends and colleagues of **Mr. F. J. Wildsmith,** Branch Commercial Manager at the Ringwood branch of the Lyndhurst District, Southern Electricity Board, attended a smoking concert at Ringwood, Hants, last week to mark his retirement after nearly 50 years in the industry. Mr. Wildsmith was engaged in the construction of the Ringwood station in 1925 for the then Ringwood Electric Supply Company. In 1929 when the company was controlled by the West Hampshire Electricity Co., Mr. Wildsmith was appointed district engineer which post he held until 1948 when he was appointed branch commercial engineer.

Mr. A. N. Bott, M.I.E.E., district manager, made the presentation of a gold watch to Mr. Wildsmith. His successor as branch commercial engineer is Mr. W. P. Conly, M.Sc., A.M.I.E.E.

OBITUARY

We are unhappy to announce the death on Saturday last of **Engineer Vice-Admiral Sir John Kingcombe,** K.C.E., M.I.Mech.E., M.I.N.A., Engineer-in-Chief of the Fleet 1945-1947, and a member of the South Western Electricity Board. Born in April, 1890, he had an interesting career in the Navy. An Engineer Captain in 1935 and Fleet Engineer Officer Home Fleet 1939-1940, he was promoted Engineer Vice-Admiral in 1945.

It is with deep regret that we record the death of **Mr. John B. Low.** Mr. Low was chief civil engineer of the Power Cable Contract Department of British Insulated Callender's Construction Co.

He was educated at Dunfermline High School and Edinburgh School of Art, and, subsequently, was articled to F. W. Deas, F.R.I.B.A. After serving with the R.F.C. in the Middle East during the 1914-18 war, Mr. Low joined the staff of Sir Alexander Gibb and Partners, for whom he carried out work in Scotland and, in the early days, at Barking Power Station. In 1929, he joined Callender's Cable and Construction Co., Ltd.—now amalgamated into the B.I.C.C. Group.

Whilst on a fishing holiday at Loch Awe the death occurred of **Mr. Donald Smeaton Munro,** M.I.E.E. Mr. Munro was born in 1879 at Glasgow. Educated at Glasgow High School, the Royal Technical College and Glasgow University, Mr. Munro joined the engineering firm of Anderson and Munro at their Edinburgh branch. In 1928 he was elected to the council of the I.E.E. and was for many years hon. treasurer of the I.E.E. Benevolent Fund in the East of Scotland. In 1947 he was chairman of the Scottish area of the Electrical Industries Benevolent Fund, and was president of E.C.A. of Scotland 1922-23. Mr. Munro was a founder member of N.R.E.I.C. and founder member and president of the Edinburgh Electrical Society, Chairman of the I.E.E. Scottish Centre in 1928. He invented and patented several safety devices, was the author of many books and of many articles in the technical press. He was first editor of the *Scottish Electrical Magazine* when the paper was founded in 1930.

Mr. N. Gunn

Mr. D. S. Munro

His many friends will regret to hear of the death on July 7 of **Mr. N. Gunn,** Director and Secretary of Mullard Electronic Products and associated companies. Mr. Gunn joined Mullard's as assistant to the managing director in September, 1924, although his connection with the company dated back to 1920 when he was concerned with the legal work in the incorporation of the company.

A.C. Commutator Motors

A Comparison of Rotor and Stator-Fed Types for the Student

By D. R. N. SEED

SOME confusion of thought frequently exists regarding the characteristics of the two main types of shunt-characteristic variable speed polyphase commutator motors. These are, of course, the rotor-fed or Schrage motor, in which speed variation is obtained by brush movement, and the stator-fed pattern, in which speed regulation is by means of an induction regulator. It is not within the scope of this short article to discuss at any length the relative merits of these two main types of a.c. commutator motor. The final choice between the two can be made only after a full investigation into the characteristics required, the site conditions and maintenance facilities, and the economics of capital cost and power supply tariffs; it will obviously depend also upon the individual experience of the engineer responsible for the decision.

The technical development of both types has now reached such a stage that they may be confidently adopted for those drives (which are, nevertheless, fewer in number than is often realised) where a truly variable speed is essential and the introduction of direct current is to be avoided.

Suffice it to say, then, that in this article the working principle of both types, and a few only of the peculiarities of each, have been presented in an attempt to bring about a clearer understanding of the theory and practice of these machines.

Operating Principles

The principles of operation of the usual types of polyphase commutator motor depend entirely on the effects consequent upon the injection into the secondary windings of an induction motor of an additional slip frequency e.m.f. The commutator inseparable from practical solutions to the problem of the variable speed a.c. motor acts invariably as a frequency changer to produce e.m.f.'s of the correct frequency for injection.

Consider the secondary of an ordinary induction motor operating against constant torque and with a small slip. The total e.m.f. in one phase is the slip e.m.f. E_s; neglecting the secondary reactance (which is small at speeds near the synchronous) the current I_2 sufficient to produce the required torque is given by E_s/R_2. If now an e.m.f. E_i *at slip frequency* is injected into the secondary from some external source, then the resultant e.m.f. will be the vector sum of E_s and E_i. Suppose E_i to be in phase with E_s then the resultant current will be $(E_s+E_i)/R_2$; this increased current will produce an increased torque, so that the machine will accelerate until the slip e.m.f. E_s has decreased sufficiently (it may even reverse, of course) to reduce the resultant e.m.f. (and thus the current and torque) to the original value (Fig. 1a). Had E_i been in opposition to E_s the resultant e.m.f., current and torque would have been reduced, and the machine would have decelerated until the slip e.m.f. had increased sufficiently to restore the torque to its original value (Fig. 1b). Thus the *speed* of the machine can be varied by the injection of a directly additive or subtractive e.m.f.

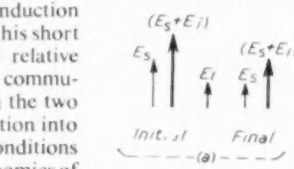


Fig. 1 (a)

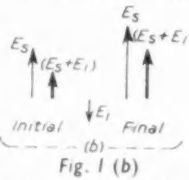


Fig. 1 (b)

Suppose now that the injected e.m.f. leads the slip e.m.f. by 90°. The resultant e.m.f. will then lead the original e.m.f. by some angle dependent on the relative magnitudes of E_s and E_i; the current will be advanced in phase, but its "power" component will remain constant (Fig. 1c). There will thus be no appreciable speed change, but, since the leading secondary current will be "reflected" into the primary by the usual transformer action, the power factor of the machine will be improved.

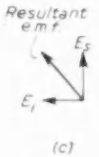


Fig. 1 (c)

It is clear then that the speed and power factor of an induction motor will be controllable within limits by the injection into the secondary circuit of a slip frequency e.m.f. whose magnitude and phase are themselves

controllable. If this simple phenomenom is examined more closely it will be seen that this injection of an additional e.m.f. can also be considered as the addition of power to the secondary from the external source, causing its mechanical output to increase; the injection of a subtractive e.m.f. is conversely equivalent to a withdrawal of power and leads to a reduction in output. The injection of the leading e.m.f. is equivalent to the introduction of a source of leading reactive volt-amperes, the power output being unaffected but the resultant power factor changing for the better. This simple idea of the transference of power and reactive volt-amperes to and from the secondary of an induction motor is probably the easiest introduction to the basic principles of the a.c. commutator motor.

In practice, of course, it becomes necessary to modify this simple explanation somewhat when the slip frequency becomes high enough for the secondary reactance to be appreciable. This in no way affects the basic theory, however, since it is clear that the machine output against constant torque will always be determined by the power component of the secondary current, and the power factor will always be influenced by the reactive component.

It cannot be too strongly emphasised that the injected e.m.f. must be of the same frequency as that of the inherent rotor e.m.f., i.e. the slip frequency. If this were not so the required interaction between the inherent and injected e.m.f's and currents would be impossible, and the theory invalid.

It is worth noting at this point that the degree of speed regulation required will decide the size of the regulating equipment, whatever its type. This equipment has clearly to handle an amount of power corresponding to the difference between the output of the machine at synchronous speed and the output at the maximum or minimum speed. If, for example, a 50% speed increase is required, then the regulating equipment must handle 50% of the motor output at synchronous speed. Further, provided that the regulating equipment is reversible (i.e. that it is capable of handling power in either direction), the speed range available will be approximately symmetrical about synchronous speed. Since the size and cost of the regulating equipment will obviously depend to some extent on its output, the total cost of the motor will also depend on the speed range required.

There are two principal types of a.c. shunt commutator motors employing the basic theory already discussed. These are: (*a*) the rotor-fed or Schrage type, and (*b*) the stator-fed or induction regulator type, and they differ only in the methods used to effect the necessary power transfer to and from their secondary windings.

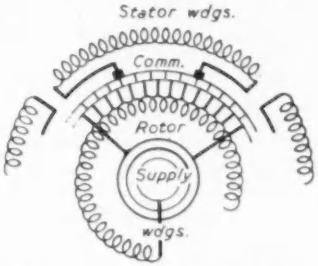


Fig. 2. Schematic diagram of simple rotor-fed motor

The Schrage Motor

This consists essentially of an *inverted*, i.e. rotor-fed, induction motor whose primary windings are connected to a commutator as well as to the supply sliprings. The stator (secondary) windings are of the usual phase-wound type, but the two ends of individual phases are brought out to pairs of brushes on the commutator, each pair being arranged so that the two brushes may be displaced in opposite directions relative to the centre-line of the corresponding stator phase. Two separate "tracks" and brush rockers are provided, so that the two brushes may be "crossed" if required; arrangements are also made so that the complete brush system can be shifted round the commutator if required, thus effecting an angular displacement between the centre-line of a pair of brushes and that of their stator phase

Operation

Consider the machine with the brushes as in Fig 3a, i.e. on the same commutator segment. The secondary is clearly short-circuited through the brushes and this segment, and the machine will thus run as an ordinary induction motor, with some small slip corresponding to the load torque. If the brushes are now separated as in (b) an e.m.f. will be collected by the brushes from that section of the primary embraced by them. For a given displacement the brushes will always (no matter what the speed of the rotor) be connected to that section of the primary occupying a certain fixed position in space, exactly as in the ordinary d.c. machine, and it follows, therefore, that the e.m.f. appearing at the brushes will be at slip frequency, i.e. at the

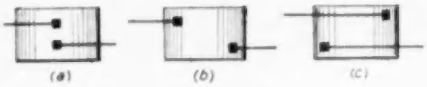


Fig. 3. Diagram of brush-shifting arrangements

same frequency as that in the secondary windings, which are also stationary in space. Here, then, the commutator is, as always, acting as a frequency changer, converting the supply frequency in the rotor to the slip frequency required for injection into the stator.

It will be apparent that if the centre-line of the pair of brushes coincides with that of their stator phase then the injected and slip e.m.f's will be in phase with each other, and the e.m.f. at the brushes will combine with the slip e.m.f. in the secondary to produce the speed and output changes already described.

If the brush positions are reversed, as in (c), the phase of the injected e.m.f. will be reversed also, so that if position (b) leads to an increase of speed then position (c) will lead to a corresponding decrease.

If, however, the brush system as a whole is shifted round the commutator there will be an angular displacement between the centre-lines of a brush pair and the corresponding stator phase. The phase of the injected e.m.f. will thus be altered relative to that of the slip e.m.f., and the change in motor power factor already described can be made to occur.

The motor speed is thus adjusted by *brush separation*, and the motor power factor by *brush shifting* as a whole.

Tertiary Winding

In practice it is found inconvenient (for reasons connected with primary-secondary transformation ratios and with commutation) to connect the primary windings directly to the commutator. A tertiary or regulating winding is therefore employed, having fewer conductors than the primary but wound in the same slots, and it is this tertiary winding which is connected to the commutator; by direct transformer action from the primary a lower voltage is induced in this winding, and it is this lower voltage which is injected via the commutator and brushes into the secondary (Fig. 4). The commutation is much improved in this way, since the voltage in those sections of the winding short-circuited by the brushes is reduced. In spite of this, however, it becomes necessary in the larger machines to use special additional "damping" windings to assist in commutation; the discussion of these, together with such considerations as output limits, etc., is, however, outside the scope of this article.

At speeds much above the synchronous the power factor of this type of machine is inherently good, since the secondary reactance becomes capacitive. The need for power factor correction thus varies with the speed, and because of this and to avoid separate power factor adjustment, the gearing to the two sets of brushes is often designed to give unsymmetrical brush displacement. In this way a gradual phase shift from zero at top speed to a maximum at bottom speed is obtained automatically.

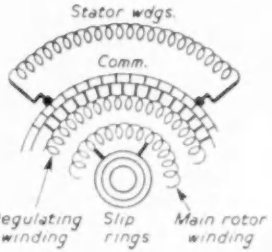


Fig. 4. Schematic diagram of rotor-fed motor with regulating winding

Characteristics

Typical performance curves for this type of machine are given in Figs. 5 and 6. It will be seen that the speed torque curve for a given brush setting is of the characteristic shunt type, the speed regulation increasing as the brush shift reduces the mean speed. The efficiency and power factor are noticeably better at the higher speeds. The variation in efficiency is mainly due to the fact that (as in most constant torque machines) a large proportion of the losses are independent of the output; the reason for the variation in power factor has already been mentioned. The usual speed range for standard machines is 3 or 4:1, though wider ranges are obtainable if required.

The starting equipment is very simple, it being necessary only to adjust the brush-gear to the low-speed position and close the main switch, an interlock being provided so that the switch cannot be closed until the brush-gear is in the correct position. The starting torque and current are comparable with those of a slip-ring induction motor.

On larger machines where the brush shift requires a considerable mechanical effort it is usual to employ small pilot motors to operate the brush-gear, and this type of control is in any case adopted wherever remote control of motor speed is required. "Inching" can be

obtained by the temporary insertion of secondary resistance.

The machine finds its chief application in paper making, textile and printing processes, where accurate speed control is often essential.

The Stator Fed Motor

In this type of machine the more normal induction motor construction is adopted. The primary is of the usual type and is on the stator; the secondary is on the rotor and is connected to a commutator. A fixed brush system on the commutator is connected to a source of variable voltage, usually a twin induction regulator

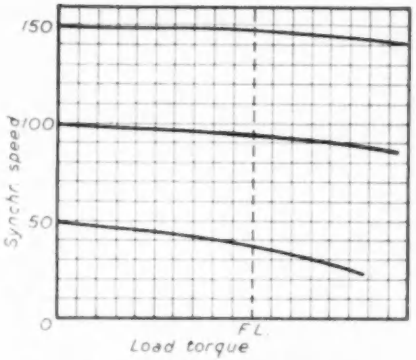


Fig. 5. Speed torque curves for different brush settings

(Fig. 7). It will be clear that if the output from the regulator is zero (for example, its primary may be disconnected from the line) then the motor will run as an induction motor, with a slip rather greater than normal on account of the additional resistance introduced by the regulator secondary and the brushes. If now an

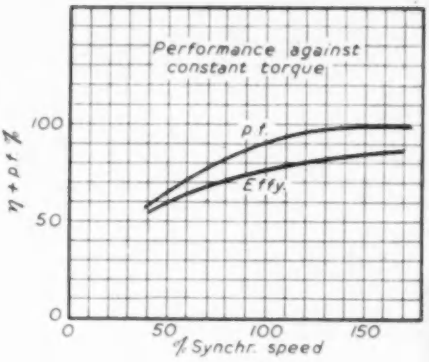


Fig. 6. Performance against constant torque

output voltage variable in magnitude and phase is obtained from the regulator and injected via the brushes into the motor secondary, it is clear that the speed and power factor variations already described in detail can be brought about. Once again the function of the commutator is that of a frequency-changer, converting the supply frequency of the regulator to the slip frequency required for injection into the rotating secondary.

The regulator can take any convenient form, the most usual being a twin induction regulator for step-less speed control or a tapped secondary transformer if a set of definite speed steps is suitable for the application. The quadrature voltage required for power factor correction can also be obtained in several ways; for example, the rotor shifts of the twin regulators can be made un-symmetrical so that the quadrature e.m.f. varies with speed as in the Schrage motor, or a constant e.m.f. can be obtained from auxiliary windings on the regulator or on the motor stator.

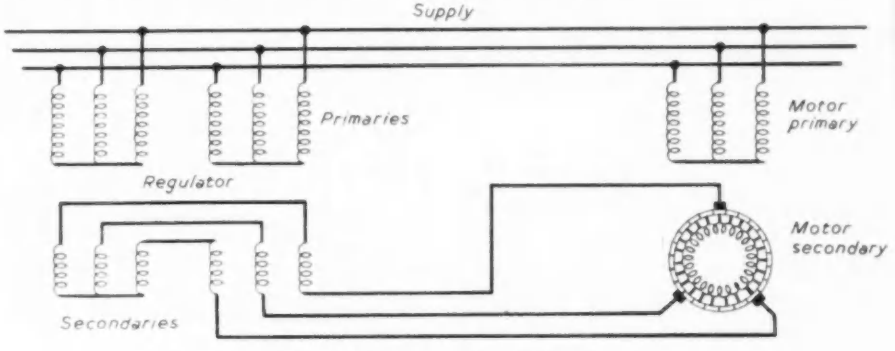


Fig. 7. Diagram of stator-fed motor

C

Characteristics

The performance of this type is in general very similar to that of the Schrage motor. The speed-torque characteristic at a given brush setting is again of the shunt type, although the speed regulation at the lower speeds is usually greater than that of the rotor-fed type on account of the inherent voltage regulation of the regulator itself. There is a tendency for the overall power factor to be inferior, since the regulator itself requires a constant magnetising current in the same way as the motor stator; if excessive compensation is introduced to offset this tendency the efficiency may suffer. The speed range is similar to that of the rotor-fed machine, though additional speeds or a particularly low speed for inching can here be conveniently obtained by using intermittently rated tappings on the regulator primary or by reconnecting its windings.

The arrangements for starting are similar to those for the Schrage type, i.e. the regulator is set to the low speed position and the main switch closed.

A degree of remote control is possible without the use of a pilot motor, though the need for heavy current cables between motor and regulator limit the scope of this advantage somewhat. Nevertheless, this feature does often make it possible to locate the motor itself in a position in which there would be insufficient room for the Schrage type, the regulator being placed in some other position close by but convenient for the operator. Pilot motor control from a remote position is, of course, possible if required.

The smaller physical size and the absence of brush-shifting mechanism gives this type a further advantage in that it renders total enclosure much less difficult. Total enclosure is often the only effective answer to adverse operating conditions, and this feature has opened up new fields for the commutator motor—ones in which it has hitherto been considered inherently unsuitable, such as in applications to power station auxiliary drives and in the cement and chemical manufacturing industries. The regulator can, of course, be totally enclosed and oil-immersed in any case.

THE B.S.I. ANNUAL GENERAL MEETING

SIR WILLIAM LARKE presided at the annual general meeting of the British Standards Institution, held on Tuesday of last week, when Sir John Anderson was elected president for the coming year (see "Personalities," last week).

Expansion of Activities

In presenting the annual report, Mr. Roger Duncalfe (chairman of the General Council) explained that the work had expanded during the year in all sections, both nationally and internationally. The B.S.I. had distributed nearly three-quarters of a million copies of British Standards, many of them volumes of considerable size. The B.S.I. had participated in a number of exhibitions, and the library and information service had developed substantially. He pointed out that the library now holds copies of about 43,000 overseas standards.

Reference was also made to the growth in certification marking and to the work of the B.S.I. in connection with securing approval to electrical appliances for export to Canada. During the year a further Overseas Committee had been set up in Rhodesia, and the recognition of the value of British Standards in overseas markets was an increasing aid to exporters.

In conclusion, Mr. Duncalfe pointed out that it had become generally recognised that today, standardisation is a function of industry to be discharged by industry through an autonomous body on which industry itself, producers, consumers, professional institutions, research associations and government departments are represented, and he was glad to say that this position was recognised and accepted by the creation and growth of the B.S.I.

Increased Expenditure

Mr. John Ryan, chairman of the Finance Committee, presented the accounts, which reflected the growth in the work, income and expenditure (£214,000) having increased by 40% over the previous year.

Sir William Larke, the retiring president, in his closing address, called attention to the valuable work which the B.S.I. had done over so many years. He emphasised the need for the B.S.I. to remain an independent body, supported by all sections of industry and Government under the direct control of an elected Council; dwelt on the value of standardisation to the community as a whole; and expressed the view that industry must recognise its responsibilities for maintaining this central organisation.

At the conclusion of the address a very cordial vote of thanks was accorded to Sir William Larke for the many years of service which he had given in the inner councils of the B.S.I.

The BUYER'S *Column*

Safety Where There's Danger

PERMISSIBLE electrical apparatus for use in hazardous atmospheres was discussed in a paper by Mr. S. W. Richards, M.I.MIN.E., which was read last year. The General Electric Co. have now issued reprints of this useful work, which begins with a consideration of just what are the "hazardous atmospheres" mentioned in the title. The construction of suitable apparatus is then discussed, and the paper ends with a description of the possibilities of fluorescent lamps for flameproof applications. Copies of the paper are obtained from the GENERAL ELECTRIC CO. LTD., Magnet House, Kingsway, London W.C.2.

Fisher's Fourth

THE announcement of a new washing machine manufactured by H. FISHER (OLDHAM) LTD. brings the range up to four—"De Luxe," "Standard," "Washette," and the new machine, the "Junior," which follows the principles of its larger brothers, having the well-known Fisher agitator and gear box, but with a hand-operated wringer. An ⅛ h.p. motor is used, and the machine has a capacity of 4 lb. of dry clothes. Hosepipe draining and a foot-operated switch are provided, and the machine can be stowed under a draining-board, the wringer being readily removable. Price is approximately £28 plus P.T. and deliveries are expected to commence in September.

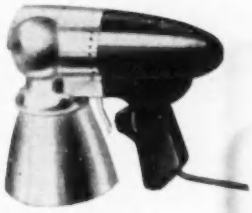
The Fisher "Junior" washing machine

New Degreaser for Aluminium

JENOLITE LTD., of 43 Piazza Chambers, Covent Garden, W.C.2, announce that they will shortly be marketing a new aluminium degreaser and cleaner known as Jenolite Aluminium Degreaser A.C. Supplied in powder form, for dilution with water, it can be applied cold and is claimed not to attack even polished surfaces in any way. Samples are available from the Press Dept., 5 New Bridge Street, E.C.4.

What ! No Air ?

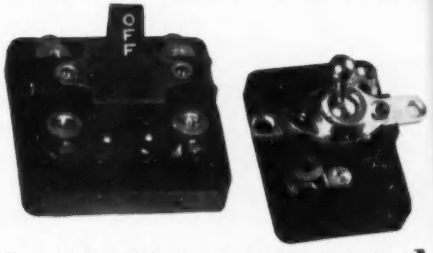
PAINT spraying without compressed air is the achievement of the "Egaspray" all-electric spray gun manufactured by EGA DEVELOPMENTS LTD. A completely self-contained unit, the gun uses the edges of high-speed centrifuges to atomise and throw the liquid, which is fed by a screw-type feed pump gear-driven from the built-in driving motor. The motor runs continuously, release of the trigger opening a gap in the feed tube which allows the liquid to return to the container, thus keeping it continuously stirred. Since air is not blown out with the paint particles, it is claimed that there is no mist or bounce and that it is possible to work within 1 in. of the surface being sprayed. Consumption is about 60 W only.



The "Egaspray" airless paint gun

A Compact Slow-Break Switch

A NEW 15 amp a.c. slow-break switch has recently been added to the range manufactured by A. P. LUNDBERG AND SONS, LTD., of Rood End Road, Oldbury, Birmingham. Available in d.p. and s.p. models, it can be supplied with bakelite dolly for surface mounting or a brass dolly and bridge for flush mounting. Spring-loaded silver contacts are used, the action being positive. The switch can, it is stated, be comfortably wired and fitted in a 5-amp. B.S.1299 box. Other good points are that the terminal screws are radiused to prevent cutting into cables, and the cover fixing screws on surface-mounting types are secured by captive washers. List prices range from 4s. 2d. for s.p. flush pattern to 5s. 5d. for the d.p. surface pattern.



Two varieties of the new Lundberg switch, for d.p. surface mounting and s.p. flush mounting

TRADE PUBLICATIONS

DRYING CABINETS. The "Chalex" drying cabinet is described in a new leaflet issued by C. Homslow and Co. Ltd., Chalex works, Southwick, Sussex.

EARTH LEAKAGE C.Bs. Siemen's voltage operated earth leakage circuit breakers are illustrated in catalogue Z174. Interesting is the earth leakage cooker control unit, ELC100 which is illustrated in this brochure issued by Siemens Electric Lamps and Supplies Ltd., 38 Upper Thames Street, E.C.4.

ELECTRIC HOME AND OFFICE FANS. Following on our recent surveys we were interested to receive the new fan catalogue issued by Rich and Pattison (Birmingham) Ltd., 81 Jamaica Row, Birmingham 5, manufacturers and wholesalers.

REFRIGERATION FOR THE FISH TRADE. An interesting brochure entitled "Ideal Fish Storage conditions ensured by Prestcold Refrigeration," and numbered Z41, has been published by the Pressed Steel Company Ltd. Copies are available from the Refrigeration Division of the company at Cowley, Oxford.

ELECTRIC FURNACE EQUIPMENT. Among recent publications by Birlec Ltd., Tyburn Road, Erdington, Birmingham, are the following: "Gas Carburizing—a review of electric furnaces developed for this Process," reprinted from the *Automobile Engineer*. Two leaflets on induction heating for forging and electric furnace brazing. "The annealing of white-hot malleable castings," a report by Dr. Schulte of Birlec Ltd., published in the *Journal of Research and Development of the British Cast-iron Research Association*. "Carbon Steels," by P. F. Hancock, B.A., chief metallurgist, Birlec Ltd., reprinted from *Iron and Steel*. "High Frequency Induction Heating," reprinted from *Metallurgia*, and three new brochures on Shaker Hearth Conveyor furnaces, large batch-type heat treatment furnaces and vertical forced air circulation furnaces for low temperature heat treatment.

PHOSPHATES FOR BOILER WATER CONDITIONING. This practice has expanded rapidly in the past few years and is now well established as the most satisfactory method of preventing scale deposits in boilers. One of these phosphates is "Calgon" the brand of sodium metaphosphate supplied by Albright and Wilson Ltd., Water Treatment Department, 46 Park Lane, London, W.1. Literature on this and other products of the firm is available.

MEASURING INSTRUMENTS. A price list of electrical measuring instruments, including moving coil, rectifier, thermo couple, moving iron and electrostatic types is now available from Taylor Electrical Instruments, Ltd., Montrose Avenue, Slough, Bucks.

I.E.E. COUNCIL AND OFFICERS

Sir Archibald Gill

DETAILS of the constitution of the Council and of the Section Committees for the 1950-51 season have now been released. Following a ballot held earlier the following have been elected to fill vacancies occurring September 30.

COUNCIL

President: Sir Archibald J. Gill, B.SC.(ENG.).

Vice-Presidents: H. Bishop, C.B.E., B.SC.(ENG.), Sir George H. Nelson.

Honorary Treasurer: H. Nimmo.

Members: T. E. Allibone, D.SC., PH.D., F.R.S., Prof. B. Hague, D.SC., PH.D., H. D. McLaren, C.B., D.F.C., B.SC., C. E. Strong, O.B.E., B.A.I.

Associate Member: R. A. Smith, M.A., PH.D.

CHAIRMEN LOCAL CENTRES

Western: G. D. Arden.
N. Western: H. G. Bell, M.SC.TECH.
Mersey and N. Wales: J. Eccles, C.B.E., B.SC.
North Midland: W. F. Smith, B.SC.(ENG.).
East Midland: R. C. Woods.
South Midland: D. H. Kendon, B.SC.(ENG.).
North Eastern: A. Watt, B.SC.(ENG.).
Scottish: J. Henderson, M.C., B.SC.
Southern: R. E. S. Soper, B.SC.(ENG.).
Northern Ireland: R. P. Watson, B.A.

SECTIONS

Measurements

Chairman: C. A. V. Sowter, PH.D., B.SC.(ENG.).
Vice-Chairman: L. Hartshorn, D.SC.
Ordinary Members: W. Bamford, B.SC.(ENG.), Prof. H. E. M. Barlow, PH.D., B.SC.(ENG.), A. H. Gray, M.SC., S. F. Musson, B.SC., L. G. A. Sims, D.SC., PH.D.

Radio

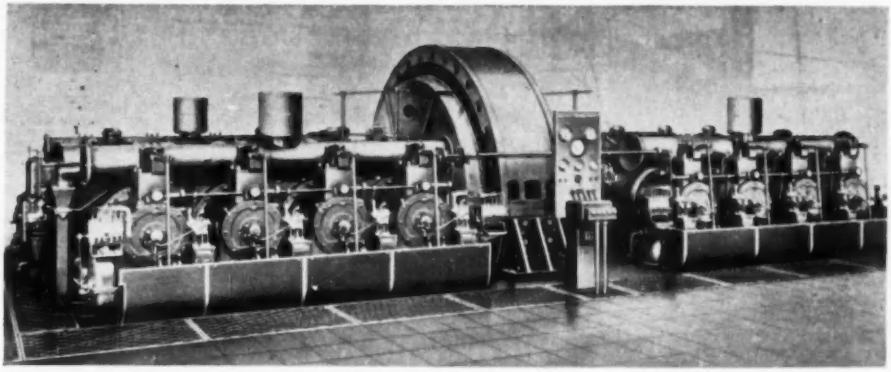
Chairman: C. F. Booth, O.B.E.
Vice-Chairman: E. C. S. Megaw, M.B.E., D.SC., B.SC.
Ordinary Members: E. C. Cherry, M.SC.(ENG.), C. W. Oatley, M.A., M.SC., M. J. L. Pulling, M.A., P. H. Spagnoletti, B.A.

Supply

Chairman: S. E. Goodall, M.SC.(ENG.).
Vice-Chairman: C. M. Cock.
Ordinary Members: J. Christie, P. M. Hollingsworth, M.ENG., H. V. Pugh, Prof. M. G. Say, PH.D., M.SC., C. E. H. Verity, O.B.E.

Utilisation

Chairman: A. N. Irens.
Vice-Chairman: J. W. T. Walsh, M.A., D.SC.
Ordinary Members: R. H. Cobbold, B.A., F. C. Fuke, J. Vaughan Harries, A. G. Ramsey, O.B.E., B.SC.(ENG.).



Power for Gold Dredging

THE mud and gravel of the bed of the Ankobra River, in the Gold Coast colony, are sufficiently rich in alluvial gold to warrant development on a commercial scale, and some ten years ago, the Bremang Gold Dredging Co. Ltd., installed some electrically - operated dredgers for extracting this gold. Supply to the dredgers is from individual substations fed by a 55 kV overhead transmission line from the power station at Ankobra Junction, a distance of about 20 miles.

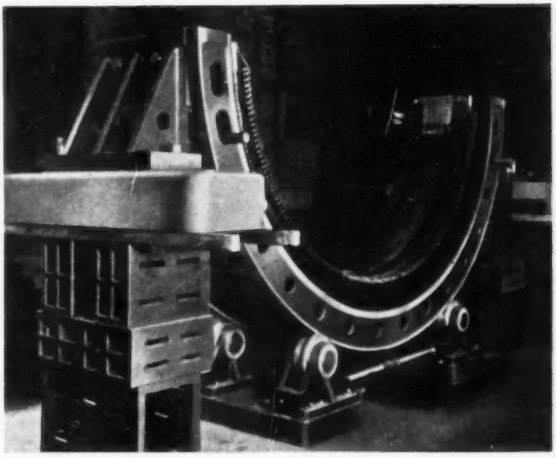
G.E.C. were responsible for the majority of the electrical equipment, including the generating plant, the main switchgear, the 55 kV outdoor substation equipment, the dredge substations, and the contactor gear for the drives on the dredges.

Recent developments made it necessary to increase the station capacity, and accordingly orders were placed with G.E.C. for two 1,500 kW sets.

As can be seen from the illustration the engine is a Crossley-Premier, sixteen-cylinder, eight-crank horizontal engine, having a maximum output of 2,750 b.h.p. at 214 r.p.m. The centrally disposed alternator avoids critical periods within the running range.

Alternator

Salient pole construction has been adopted for the alternator, which generates power at 3·3/3·45 kV at 0·8 p.f. at 214 r.p.m. While electrically the design is in accordance with G.E.C. standard practice, special arrangements have been made to facilitate maintenance. As the alternator is mounted between the two sections of the engine, a conventional machine would require the dismantling of part of the oil engine, to allow access to the windings. With this machine, however, the stator is normally supported by removable feet bolted on each side of the c sing. Immediately below the stator is a roller cradle in the bottom of the pit. The rollers on this cradle can be moved by adjusting screws into position for supporting the stator, the feet having been unbolted. It is then possible to rotate the whole stator for winding examination, etc.



Test assembly showing method of rotating stator

THE WEEK

INDUSTRY *in news* COMMERCE

Caisson Sinking at Uskmouth

THE work of sinking one of the largest pneumatic caissons in the world commences next week at the site of the Uskmouth Generating Station, near Newport, Mon. First part of the station will have a capacity of 360 MW—more than twice the capacity of the largest generating station in the South Wales Division at present. To supply the circulating water for the condensers of the six 60 MW turbo-alternators, a pumping station must be constructed housing circulating water pumps capable of supplying 15 million gallons of water per hour. Because the River Usk has a rise and fall of approximately 44 ft the pumping station has to be sunk below the bed of the river.

The caisson steel work, which is of welded construction throughout, will weigh 580 tons. The shoe of the caisson has a peripheral cutting edge and there are also two internal cutting edges which divide the steel structure into three bays. These three chambers are connected by emergency access passages.

The caisson will be sunk by excavating inside the working chambers at the same rate as the building up of the concrete walls of the partitions of the pumping station structure. The excavating material will be taken out of each of the three working chambers by means of a fast 2-ton electric derrick, working through air shafts provided in the chambers, and the level of the top of the concrete walls will be kept about 30 ft above the mean tide level to prevent any possible flooding by an exceptionally high tide.

Licences for Electrical Work

"APPLICATIONS for licences, whether for new electrical installations or for repairs to existing electrical installations, should no longer be referred to the Electricity Board," a recent Ministry of Health circular (69/50) points out to all housing authorities in England. "Applicants should, however, be advised, where appropriate, that the granting of a building licence gives no guarantee that the Electricity Board will provide a supply."

Scots Consider District Heating

DISTRICT heating schemes are now being considered in a number of Scottish centres. Among the areas which the Scottish Fuel Efficiency Committee have listed are Bonnyrigg, where open fires are to be completely eliminated, and Woodside, near the new town of Glenrothes where 238 houses are to be fitted out with the system.

Other proposals which have been listed and are under consideration cover East Kilbride, Priesthill, in Glasgow, Greenock and Kirkcaldy. Perhaps the largest scheme is that proposed at Clydebank where the biggest scheme in Britain and probably in Europe is anticipated. There some 1,700 houses are to be linked to district heating.

Plastics Exhibition in 1951

FURTHER details of next year's British plastics exhibition and convention have just been announced. To be held in Olympia, London, from June 6 to 16, the exhibition will coincide with the Festival of Britain.

Convention sessions will fall into three categories—morning lectures for technicians in the plastics industry, afternoon technical or semi-technical lectures for the chemical and consumer industries generally, to which the public will also be admitted, and special sessions for the public including women's organisations, on such subjects as the uses of plastics in the home. There will also be public film shows.

E.D.A. Film on T.V.

E.D.A.'s educational film *What is Electricity* will be televised in the B.B.C. afternoon programme on Thursday, August 10. The film is among those chosen by the standing festivals committee of the Association of Specialised Film Producers, to be presented at the 1950 Venice Film Festival next month.

Freer Imports

THE BOARD of Trade announce that existing Open General Licences issued in connection with the policy for the liberalisation of trade have been extended to Belgium, Luxembourg and the Belgian Congo with effect from Monday, July 17. This will result in a large range of goods from these countries being freed from import licensing restrictions. Those who wish their licences to be extended to include these countries should return them to the Board of Trade Import Licensing Branch, Romney House, Tufton Street, S.W.1, for amendment.

The First Half-Century

We shall have the members of the American Institution of Electrical Engineers here for a few days before our joint meeting in Paris. It will be seen from a later page that the I.E.E. is laying itself out to give its guests a good time. They may be sure that the most cordial of welcomes awaits them here.—*From our issue of July 19, 1900.*

Left: Mrs. Phillip Sporn, U.S.A. and Mr. H. F. Carpenter listen attentively to Lord Citrine at a reception to delegates' wives during the World Power Conference last week

Right: Mrs. G. Leslie Wates receives a bouquet from Rosemary Ann Cantle at the J. and P. sports

J. and P. Sports

JOHNSON AND PHILLIPS LTD., celebrated their 75th anniversary with a sports day recently, the events attracting a very large number of entries. Mrs. G. Leslie Wates, wife of the chairman of Johnson and Phillips Ltd., distributed the prizes and presented the Challenge Shield to the Maintenance Department which repeated its success of last year.

Southern Farming Shows

ACCOMPANIED by Princess Margaret, their Majesties the King and Queen made a short tour of S. Western Board's stand at the Royal Cornwall Show last week. The King, who had previously visited a number of the Royal Duchy farms, was especially interested in electrical equipment for farming, and paid particular attention to the latest electric milking machines.

The Queen was attracted by the domestic section and she discussed electric cooking with the demonstrator, Miss U. M. Robertson, of Torquay. On view was the prototype of Parnall's new automatic washing machine which is to come on the market in October.

Despite severe storms on the second day, there was a total attendance of over 40,000, a record for the Show. The Board's stand was thronged with visitors and the staff on duty were kept busy demonstrating appliances.

The Royal Pavilion, specially erected for the King and Queen's visit, and containing an all-electric kitchen, was opened for inspection by the public on Thursday.

Several new features were introduced into the South Eastern Board's exhibit at the Kent Show, and about 5,000 people visited the stand last week. A large decorative facia with the word "Electricity" picked out in letter blocks and displaying the Board's abbreviation "Seeboard" drew the public's attention to the stand.

Visitors saw demonstrations of wood-turning and welding; the G.E.C. Crop Conservation exhibit, New Michigan grain elevator and Mathew and Yates's portable pneumatic grain elevator. Outside the marquee were electric vehicles, greenhouse heating and soil warming.

The Queen, accompanied by Mr. S. F. Steward, C.B.E., chairman of S. Western Board (left) and Mr. A. C. Owen, M.C., Cornwall sub-area manager (right) in the reception pavilion of the board's stand at the Royal Cornwall Show

Some of Seeboard's staff and friends photographed at the Kent show. (Left to right) Messrs. P. Turner, E. C. Claydon, R. Levett, Mrs. Knell, Messrs. A. C. Lyle, M. A. Bulloch, H. F. Knell, R. E. Gamlen, G. Ingamells, G. D. McKenzie

Revo "Truvolite" lighting fittings have just been installed at the Albion Mills of Parkland Manufacturing Co. Ltd. Our photo shows a section of the weaving department where there are 386 new fittings

A dual carriageway at High Street, Lanark, where Revo "Sol-etern" fluorescent lighting fittings have been installed on Revo cast iron columns. Each fitting carries two 80-watt 5 ft lamps

Prince's Dock to be All-electric

CLYDE Navigation Trust has resumed work on the programme of electrification of Prince's Dock, begun in 1937 and terminated by the war. Eight new electric cranes and 15 new electric capstans will replace the old hydraulic units. The installation involves the laying of miles of cable and building a new sub-station.

First of the new cranes is now being assembled on the site and work will go on till the entire scheme has been completed. In all, the development plan will cost in the region of £1 million. It is under the control of the Clyde Navigation Trust mechanical engineer, Mr. W. A. Oliphant.

First of the tunnels for laying cable was recently completed at East India Dock Road

V.h.f. Radio "plots" Chimneys

TWO-WAY radio was used in London last week to explore a maze of chimneys serving one of London's largest blocks of flats. Walkie-talkies supplied by Marconi's Wireless Telegraph Co., Ltd. enabled two supervisors—one on the roof and another visiting each flat in turn—to keep in constant communication.

Over 200 chimneys on the block have to be rebuilt and, in order to avoid damage inside flats caused by falling debris and soot, the building contractors (Frederick Parker of Kensington Ltd.) decided to block the connecting fireplace as each chimney is rebuilt. The two supervisors "plotting" each chimney have found that the use of radio communication speeds up the job.

That Cable Problem Again!

TWO gangs of men, at present laying some 132 kV cable in London, heartily endorse our article *Cables are a Problem!* (p. 1010, June 15). They are currently engaged in laying cable that will take them through 7½ miles of the east and north-east London. The contract, in the hands of Pirelli-General Cable Works Ltd. for B.E.A., means laying cable under or over eleven major roads, four canals and rivers and four railways. Altogether six London Metropolitan boroughs—Poplar, Stepney, Shoreditch, Bethnal Green, Hackney and Islington—are involved.

So that traffic is not interrupted each of the major roads is being crossed by specially mined tunnels ten to twenty feet below the surface.

The work has not been altogether pleasant. Apart from the heat underground, the clay has been full of water: pumping has been continuous; the heading has not left a great deal of room to manoeuvre, because the tunnel is but 5 ft square. The contract will take 18 months to complete and will eventually mean more power for London from the new Brunswick Wharf power station.

Exterior of the Palace of Fun on Brighton Palace Pier. The dome is illuminated by 276 Royal "Ediswan" lamps in Edison striplight holders, while the interior of the dome is equipped with 284 Royal "Ediswan" lamps sprayed pink. The entrance and the outside walls are Ediswan floodlighted by 42 two-lamp units, with additional lighting effects provided for the roof

Northmet's Sports Day

NORTHMET sub-area of Eastern Board held their first annual sports day at "Woodcroft," Winchmore Hill on Saturday, when a crowd of several hundreds enjoyed an excellent afternoon's competitions. The athletics included a number of keenly contested inter-club items. In the 100 yds P. Whittaker put up the good time of 10·3 seconds in his heat in unfavourable conditions. Brimsdown power station won the tug-of-war in convincing style.

In a separate marquee an Arts and Crafts Exhibition of over 200 articles was staged, the work of the staff and their families. The prizes were distributed by Mr. S. S. Scott in the presence of Mr. C. T. Melling, chairman of the Board, Mr. W. N. C. Clinch and Mr. C. C. Hill.

Radio, T.V. Sales Steady

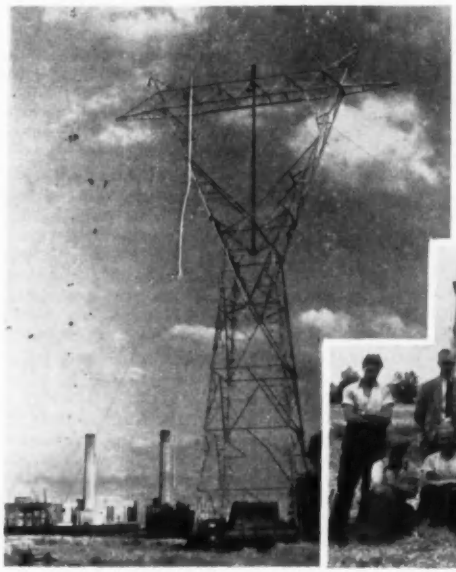
SO FAR as radio sales are concerned there has been no change compared to the previous month's figures, the R.T.R.A. sales index for May, reveals. Sales are slightly down compared with the same month last year, however, actual figures being 8·92 per shop compared with 9·32.

Television sales climbed slightly and the May figure of 6·32 per shop compares with 5·18 for April this year. The comparative figure for May, 1949 was 5·72.

Staythorpe's 275 kV Line

DESIGNED by Blaw-Knox Ltd., and fabricated by Painter Brothers Ltd., the first tower on the Staythorpe-Barnby Moor section of the new 275 kV super-grid was erected by B.I.C. Construction Co. recently (see p. 36, July 6 issue).

The route length of the section will be 20½ miles, and when completed will comprise 99 towers. Normal height of the straight line towers is to be 85 ft, and the normal span 1,000 ft. Twin 37/0·110 in. steel cored aluminium conductors on each phase will be separated from one another by specially designed spacers. The spacing between the phase conductors will be 32 ft, and they will be surmounted by two 19 110-inch steel cored aluminium earthwires throughout the length of the line. The normal suspension insulator strings will comprise eighteen 11-ins. discs which will have an overall length of 127 in.



Left: First tower on the first section of the 275 kV grid line between Staythorpe power station and Barnby Moor. Staythorpe power station is in the background. Below: B.I.C.C. engineers and the construction team responsible for the job

NEWS IN BRIEF

Just returned from Europe, Mr. Frederick Lloyd-Kessel, managing director of H. Fisher (Oldham) Ltd., has arranged new manufacturing centres for Fisher products in Holland and Italy.

Some 360 Thermovent and Thermotube heaters made by E. K. Cole Ltd. are installed in the *New Australia*. Total loading is 530 kW.

Lightweight Marconi portable television equipment is to be used to televise delicate eye operations at Moorfields' Westminster and General Hospital to 1,200 delegates to the 16th Congress of Ophthalmologic next week.

The Institute of Personnel Management announces that a four weeks' course in personnel management is to be held in Management House, Hill Street, W.1, commencing on October 23.

Minister of Fuel and Power, Mr. Philip Noel-Baker, is to open a "Fuel Efficiency in Industry and Home" exhibition to be held in City Hall, Manchester, from November 22 to December 2.

The new Orient liner *Oronsay* is to be fitted with Marconi marine radio equipment and radar.

Mullard's exhibition of electronic flash photography in the Holborn Gallery of Ilford Ltd. is to be transferred to the Engineering Centre, Glasgow, for the two weeks commencing September 18.

B.T.H. (Willesden) team, for the second year in succession, has won the A.E.I. cup in the interworks ambulance competition.

Seventy of these Creda travelling displays are at present touring the country. Multi-coloured, the double-sided displays are easily assembled and allow many different combinations

Cases in Court

S.W. Scotland Board to Pay

South West Scotland Board will have to pay most of the £52,408 awarded to Mr. James Paterson, formerly governing director of the Clyde Valley Electric Power Co., for loss of salary and pension rights. The judges' decision was announced in the Court of Session at Edinburgh on Friday, after the board had appealed against the award. The court's decision was that the amount should be only slightly reduced.

Mr. Paterson had a contract with the Clyde Valley Company whereby he received a salary of not less than £4,500 a year for 15 years from 1939. On retirement in 1954 he would have received £3,000 a year as a contributory pension. When the board terminated his contract in 1948 he was in receipt of £6,000 a year. Their Lordships were of the opinion that the amount received should be based on that sum and not £4,500 as submitted by the board.

In regard to the pension, they decided that as it was a contributory pension, Mr. Paterson was not entitled to the whole sum of £3,000 a year because he had not paid his contributions to 1954, and an adjustment would have to be made.

Paramount: Appeal Allowed

The Court of Appeal last week allowed the appeal by Paramount Supplies (Manchester) Ltd. from the dismissal by Mr. Justice Lloyd-Jacob in the King's Bench division, of their action against Thorn Electrical Industries, Ltd. Paramount claimed £3,339 arising out of an alleged contract for the sale of 25,000 Paramount tapless chokes, and 15,000 tapped chokes.

A cross appeal by the Thorn Company against the judge's dismissal of their counter-claim for £3,343, alleged to have been overpaid in respect of deliveries already made, was dismissed. The claim of the Manchester company was based on rights which they said had been transferred to them in a contract between the Thorn Company and a firm known as Paramount Products.

Lord Justice Jenkins giving the judgment of the court, said that they held that the Manchester company did become entitled to sue on the contract, there having been a novation which substituted them for the firm as a party to the contract.

There would be judgment for the Manchester company for the contract price of the chokes delivered but not paid for (which would have to be ascertained by inquiry if the exact figure was not agreed) and an inquiry as to damages in respect of the Thorn Company's refusal to take delivery of and pay for the balance of the chokes comprised in the contract. Leave to appeal to the House of Lords was granted.

Questions in Parliament

Telephones

Mr. Hobson, the Assistant P.M.G., replying to questions last week stated that there were 547,765 people awaiting telephones at the present time, and to satisfy this demand would require a capital expenditure of £300 million, whereas the Post Office had £44½ million to spend. Although 50% of telecommunications equipment was exported, 1,400,000 telephones had been installed in the past two years. Trunk call traffic is, at present, 100% above the 1938 figure and increasing 7 and 8% annually.

Steel for Poles

The Ministry of Fuel and Power was asked what amount of steel was allocated in 1949 for the supply of poles for electricity transmission. No such allotment was made for steel poles, he stated, but some 600 tons of steel were allocated that year for the manufacture of reinforced concrete poles for the purpose. The size of the allocation was largely due to the shortage of both home-grown and imported wooden poles during the first part of that year.

Supply changeover in Lancashire

Mr. Prescott (Lancashire, Darwen) asked the Minister of Fuel and Power whether he would make a statement on the progress in Lancashire in changing from direct to alternating current, and, in particular, the present position in the borough of Darwen.

Mr. Noel-Baker, replying, said that under the 1948 Electricity Act, the area electricity boards were primarily responsible for making improvements in the system of distribution such as the change from d.c. to a.c., but that they needed his consent before they changed the type or voltage of the supply to their present consumers.

He added that in 1930 the Electricity Commissioners, who were then the authority for giving consent to changes, gave consent to the Corporation of Darwen for the changeover. They had given similar consents to other undertakings in Lancashire at other times. Since the Act was passed, the North Western Electricity Board had not asked for consent to any change.

Mr. Prescott drew attention to the inconvenience which the failure to complete this changeover was causing to traders in Lancashire and asked the Minister whether he would review the matter.

Mr. Noel-Baker replied that he had done so. He imagined that the reason why the Corporation of Darwen, for 18 years and later the area board for 2 years, had not taken advantage of the full consent given to them, was that they had thought that they had better put other work first. The changeover to a.c. was an expensive and complicated affair and it appeared to be a matter of priorities.

Staff reductions at M.o.F. & P.

Replying to a question from Sir Herbert Williams, the Minister, Mr. Noel-Baker, said that his staff now numbered 5,700, of these 2,615 were engaged on opencast working of coal, 241 were employed in the Mines Inspectorate, about 200 were engaged on health and safety in the mines, about 85 on the distribution of household coal, nearly 200 on advice to consumers about the use of fuel and 200 or so on testing electricity and gas meters. When asked by Sir Herbert Williams what the other 800 were doing Mr. Noel-Baker referred him to the forthcoming report of the Select Committee.

Consultative Council, Mersey and N. Wales

In a written answer to Mr. Garner-Evans, who asked whether the Minister of Fuel and Power would afford greater representation to the rural districts on the Consultative Council of the Merseyside and North Wales Electricity Board, Mr. Noel-Baker replied that he was at present considering the appointment of some additional members of the Merseyside and North Wales Electricity Consultative Council. He hoped to increase the number of members from rural districts.

Staff Appeals

Replying to a question by Col. Clarke, Mr. Isaacs, Minister of Labour, said that appeals under Regulation 12 of the Electricity (Staff Compensation) Regulations, 1949, against the decision of an Electricity Board are heard by compensation appeal tribunals appointed by him. Details of the procedure governing appeals of this kind were published in the Ministry of Labour Gazette for April, 1950.

Tribunals

Col. Clarke then asked the Minister of Labour if he would announce the names of the members of the tribunals appointed under Regulation 12 of the Electricity (Staff Compensation) Regulations, 1949; and if he would publish the panels from which the tribunals are selected. Mr. Isaacs gave the list, details of which are published in *Hansard*.

Volta Hydro-Electric Schemes

Mr. John Grimston asked the Secretary of State for the Colonies when the report on the Volta River Hydro-Electric and Irrigation Scheme would be ready. Mr. Cook replied that the Gold Coast Government expects to receive an interim report very shortly, but he could not say, at present, when the final report would be received.

When reminded that the scheme had been investigated for three years already and when Mr. Grimston stressed the need for acceleration in providing an aluminium producing industry in Africa, Mr. Cook replied that there were two investigations actually proceeding.

Electric Supply News

Alloway

The birthplace of Robert Burns does not like modern street lighting. Since the village came within the boundaries of Ayr Town Council, the village has been illuminated by lamps mounted on eight 25 ft concrete standards. The villagers considered that the standards spoilt the amenities of the village so the concrete standards are now to be replaced by metal poles.

Douglas, I.o.M.

The effect of allowing two distinct authorities to supply electricity in the island was outlined at a meeting of the Local Government Board recently when evidence was given by the Borough Electrical Engineer and the Borough Treasurer on the £388,900 scheme for changing the Douglas supply system from d.c. to a.c. The Borough Treasurer said that if the ratepayer were left to shoulder the burden it would mean a rate of 2s. The corporation were applying for sanction to a loan of £262,100, the balance having already been approved by Tynwald. The corporation's advocate, Mr. Fargher, said it was now necessary to accelerate the programme for the changeover from d.c. to a.c.

Because the I.o.M. Electricity Board would not be taking their supply from the corporation as hitherto in view of the new diesel station (*see* ELECTRICAL TIMES, July 6), a very serious situation had arisen, and a confidential report was being sent to members of the Board.

Mr. Anderson said that it was assumed that at the cessation of hostilities and the consequent departure of service units, the load would be reduced. This had proved wrong, the load having steadily increased.

Harlow

The Parish Council, with Mr. Nigel Davies, M.P., are to meet representatives of the Eastern Electricity Board to press their request that the Hobbs Cross and Threshers Bush areas should be provided with electricity supplies. The Board, in a letter to the M.P., said that the matter had been considered before the industry was nationalised and there had not been sufficient support from these areas. The Board was now restricted in capital expenditure and by shortage of materials.

Holt

When the Parish Council met recently a resolution was passed asking the Eastern Electricity Board to remove existing poles and stays on Spout Hills to alternative positions suggested by the Council. It is considered that in their present position the poles spoil the amenities of the hills.

Malvern

The Malvern Hills Conservators Board after discussing the proposal to erect overhead transmission lines on the hills near the British Camp expressed the hope that it would be "fought to the last ditch." If the Midlands Electricity Board was successful in their application it was decided that the Malvern U.D.C. should be approached on the subject of taking further action.

Allegations that the Midlands Board were inducing new consumers to instal quarterly meters without giving them the opportunity to choose between quarterly meters or prepayment meters were made at a recent meeting of the consultative council.

Mr. J. E. Swain, leader of a deputation from the local Labour Party, said that many of the people had to adopt a "pay as you earn" and "pay as you burn" policy. It was not right that representatives of the Board should approach housewives without mentioning the prepayment type of meter.

Monmouth

The Rural District Council has requested Mr. Peter Thorneycroft, M.P., to ask in the House for details about a possible supply of electricity to the rural areas of Monmouth.

Nantwich

At a meeting of the rural council it was decided that in response to an appeal from the Willaston parish council, they would again request the provision of underground cables in supplies to houses and farms in the neighbourhood.

Roosecote: Full Capacity

B.E.A. have received the consent of the Minister of Fuel and Power to the development of Roosecote power station, Barrow-in-Furness, to its full capacity. The Minister's consent was given last October for the initial installation of plant in the station which, when completed, will have a total installed capacity of 120,000 kilowatts, made up of four turbo-alternator sets of 30,000 kilowatts each.

LIGHTING SCHEMES

Buckfastleigh.—The clerk to the urban council reported that sanction had been obtained to the borrowing of £3,600 to carry out conversion of street lighting from gas to electricity.

Croydon.—The corporation is to increase the power of street lighting in parts of Thornton Heath and South Norwood.

Didcot.—The Parish Council is to ask for consent to a further £1,000 loan for a lighting scheme on the new Richmere Estate and for renewals and replacements of existing lighting.

Frome.—Following a visit by members to Bristol to inspect mercury and sodium street lighting, the Council has decided to proceed with the preliminary arrangements for a new lighting scheme but for the time being has not decided on the type of lighting to be installed.

Midhurst.—A scheme for mercury vapour lighting, at a cost of £980, has been approved by the Rural District Council.

Company Activities

Associated British Engineering

Gross income for year to March 31, 1950, £128,026 (*£123,859*), made up of dividends from Brush Electrical Engineering for 1949 £102,894 (*£13,681*), dividends from former subsidiary companies nil (*£80,000*), dividends on other investments £24,416 (*£13,733*) loan interest and sundry income £716 (*£16,445*). Deduct management expenses, less amounts charged to associated companies, £11,348 (*£8,377*), bank interest £14,956 (*£13,260*), depreciation and amounts written off fixed assets £4,497 (*£5,823*), auditors £500 (*same*), Preference dividend arrears (net) Henry Meadows £5,500 (*£8,250*), taxation £45,526 (*£42,018*), leaving net profit £45,699 (*£45,631*). To Preference dividend £7,562 (*same*), interim Ordinary 6% (*nil*) £6,600 (*nil*), final, on increased capital, 10% (*single payment 12%*) £11,000 (*£11,088*), general reserve £50,000 (*nil*), forward £18,616 (*£48,079*).

Hackbridge and Hewittic Electric

Group trading profits to March 31 £339,748 (*£200,955*), sundry income £828 (*£3,008*), making £340,576 (*£203,963*). To audit £750 (*same*), directors' emoluments £15,100 (*£16,500*), capital increase and new issue expenses £1,700 (*nil*), depreciation £22,029 (*£20,153*), profits tax £46,000 (*£27,750*), U.K. income tax £112,000 (*£64,500*), overseas income taxes £7,981 (*nil*), leaving group net profit £135,016 (*£74,310*), less profit retained by subsidiary £13,803 (*nil*), leaving net profit of company £121,213 (*£74,310*). Brought in £27,728 (*£27,055*), making total available £148,941 (*£101,365*). To directors' pensions £5,000 (*same*), general reserve £57,500 (*£30,000*), Preference dividend £7,700 (*same*), Ordinary dividend 15% on increased capital £41,250 (*12½% £30,937*), forward £37,491.

Kalgoorlie Electric P. and L. Corpn.

Net profit for the year to December 31 last was £24,550, to which is added £10,228 (*£10,964*) brought in, less a net under-provision for taxation in previous years of £15 (*nil*), and adding U.K. tax relief in respect of initial allowances £5,215 (*£2,235*), making £39,978 (*£41,555*) available. To tax £9,814 (*£15,617*), deduct estimated relief in respect of Australian taxation £1,486 (*£6,009*), to depreciation reserve £8,328 (*£10,000*), general reserve £6,000 (*£4,500*), capital reserve £2,119 (*nil*), dividend 7% £7,219 (*same*), leaving £9,312 carried forward.

Keith Blackman and Co.

Trading profit for the year to March 31 last was £238,916 (*£302,496*), plus interest on bank deposit £729 (*£540*). To depreciation £29,774 (*£26,150*), tax £110,000 (*£150,000*), audit fee £1,135 (*£1,120*), leaving net profit £98,736 (*£125,766*). To general reserve £30,000 (*nil*), pensions reserve £30,000 (*£75,000*), deferred repairs £4,500 (*nil*), Preference dividend £6,050 (*same*), Ordinary 20% £27,500, leaving £59,659 (*£58,973*) carried forward.

Revo Electric Co.

Balance of trading account for the twelve months ended March 31, 1950, was £289,246 (*£348,987*). Directors' fees and emoluments take £13,400 (*£12,606*), depreciation £34,265 (*£26,782*), pension and assurance £6,737 (*£3,509*), profits tax £42,000 (*£45,500*), income tax £80,538 (*£117,290*), less over-provision £1,413 (*£1,883*), leaving a net balance of £113,719 (*£153,775*). With £148,196 (*£135,006*) brought in there is £261,915 (*£288,781*) available. To general reserve £17,500 (*£50,000*), to plant replacement £40,000 (*£30,000*), pensions nil (*£5,000*), interim dividend 5% £10,107, final 12½% £25,265, cash bonus £20,213 (*all same*), leaving £148,830 carried forward. Net current assets are listed at £873,097 (*£886,938*). Stock-in-trade is £714,656 (*£657,988*), debtors £396,716 (*£399,762*), creditors £254,609 (*£200,077*).

Rothermel Corpn.

Preliminary details show a group profit, including dividend from subsidiary not consolidated, of £68,817 (*£69,155*) after all charges except taxation. There is a final Ordinary dividend of 10% (*nil*), making 20% (*17½%*). To U.K. taxation £45,546 (*£50,419*).

E. & H. P. Smith Ltd.

Consolidated profit and loss account shows a trading profit for the year to March 31 of £29,208 (*£34,825, including 14 months' profit of subsidiary*), plus rent receivable £1,075 (*same*), transfer fees £13 (*same*). To directors remuneration £5,930 (*£5,555*), audit fee £550 (*same*), depreciation £3,245 (*£3,445*), leaving net profit £20,571 (*£26,363*). To taxation £11,795 (*£14,598*), general reserve £4,000 (*£5,000*), dividend 12½% £4,125 (*same*), leaving £12,310 (*£11,659*) carried forward.

Whitehall Electric Investments

For 1949, consolidated profit and loss account shows total income £143,425 (*£229,036 for previous nine months*). To directors' fees £7,229 (*£4,631*), management expenses £12,866 (*£9,894*), net loss on investments realised £33,812 (*£115,755*), provision towards depreciation of investments £4,260 (*£455*), leaving balance £85,258 (*£98,301*). To income tax on profit £39,881 (*£46,268*), profits tax relating to previous years £1,322 (*nil*), Canadian taxes £377 (*nil*), Preference dividend £40,391 (*£30,938 for nine months*), leaving £3,287 (*£21,816*) carried forward.

Dividends Declared

T. Clarke and Co., Ltd. Final dividend of 5% free of income tax, making a total for the year ended December 31, 1949 of 10% free of income tax (*same*). Meeting: September 12 at 11 a.m. at Grosvenor House, Park Lane, W.1.

Telegraph Construction and Maintenance Co., Ltd. Interim dividend of 5% actual (1s. per share) less income tax at 9s. in the £ on account of the year ending December 31, 1950.

Commercial Information

CONTRACTS OPEN

HOME

July 20.—Croydon T.C. Fireproofing electric cables and providing main control switch in temporary bungalows on the council's housing estates. Borough Valuer, Town Hall, Croydon. Deposit £1 1s. (See our July 13 issue.)

July 21.—Caernarvon T.C. Electrical work for 32 houses on Maes Barcer estate. Borough Engineer and Surveyor, Guildhall, Caernarvon.

July 21.—Hawick T.C. Electrical installation for 40 houses on Burnfoot and Burnhead housing scheme. Burgh Surveyor, Municipal Buildings, Hawick.

July 21.—Sowerby Bridge U.D.C. Fifty-six 3-lamp fluorescent street lanterns complete with chokes, correction capacitators, starter gear and fluorescent lamps, together with 36 columns of approved design. A. Womersley, Clerk of the Council, 23 Wharf Street, Sowerby Bridge.

July 22.—Great Torrington. Electrical installation in Town Hall, for Town Land Charity. S. J. Parkes, steward, 6 Halsdon Terrace, Great Torrington.

July 22.—Luton T.C. Installation of electrical services, wiring and equipment in 422 houses on the Farley Hill estate. Borough Engineer, Town Hall, Luton. Deposit £2 2s.

July 24.—Bootle. Manufacture and erection of pumping plant in Hapsford Road Pumping Station, including two sets of electrically driven unchokable pumps, each capable of 1,000 gallons per minute, for Rimrose Brook Joint Sewerage Board. Engineer to the Board, G. M. C. Taylor, Artillery House, Artillery Row, Westminster, S.W.1. Deposit £5.

July 24.—Keynsham U.D.C. Provision of street lighting on Broadlands housing estate. Engineer and Surveyor, Council Offices, Keynsham. Deposit £2 2s.

July 25.—Repton R.D.C. Electrically driven pumping machinery in duplicate at pumping station near Dalbury Hollow. F. Bailey, Clerk of the Council, "The Poplars," Rolleston Rd., Burton-on-Trent. Deposit £2 2s.

July 25.—Lancs C.C. Electrical installation at Woodlands, St. Andrews Rd. South, St. Annes-on-Sea (hostel for aged persons). County Architect, County Offices, Preston. Deposit £2.

July 28.—Macclesfield T.C. (a) Supply and erection of 120 precast concrete columns and the installation of lighting equipment including 140 watt sodium vapour discharge lamps and lanterns; (b) supply and erection of 29 tubular steel columns and installation of lighting equipment including 3/80 watt fluorescent lamps and lanterns. J. H. Dossett, Borough Engineer, Town Hall, Macclesfield. Deposit £2 2s. (See our July 13 issue.)

July 28.—Manchester T.C. Electrical installation at 10 shops, maisonettes and garages at Woodhouse Park, south-west sub-centre Portway, Wythenshawe, and 10 shops, maisonettes and garages at the south-east sub-centre Portway. City Architect, Town Hall, Manchester. Deposit £1 1s. Advertised in this issue.

July 29.—Lancs C.C. Electrical installation in 38 police houses at Stretford. County Architect, County Offices, Preston.

July 31.—Thame U.D.C. Two electrically driven vertical spindle borehole type pumps, with ancillary equipment. Engineers: John Taylor and Sons, Artillery House, Artillery Row, Westminster, S.W.1.

Aug. 1.—Bentley-with-Arksey U.D.C. Supply and installation of sodium discharge lighting centrally suspended over road A19 between Don Bridge and Magnet Hotel, by erection of either new span wires or bracket arms. Engineer to the Council, R. N. Penlington, Council Offices, Cooke Street, Bentley, near Doncaster. Deposit £2 2s. (See our July 6 issue.)

Aug. 1.—Dundee T.C. Two electrically driven centrifugal pumps to deliver 250 g.p.m. at 180 ft total head, coupled to slip ring induction motors of 400-440 V, 3 phase, 50 c/s, complete with ancillary equipment for Clatto pumping station. G. Little, Engineer and Manager, Dundee Corporation Waterworks, 17 City Square, Dundee.

Aug. 1.—Stoke-on-Trent T.C. Year's supply of electric lamps. City Surveyor, Town Hall, Stoke-on-Trent.

Aug. 4.—Bridgnorth T.C. Supply and fitting of electric lighting and power installations in 53 pre-war council houses. Council's Consulting Engineer, A. J. B. Pashler, Birmingham. Tender form from Borough Surveyor, College House, Bridgnorth. Deposit £2 2s.

Aug. 5.—Scunthorpe T.C. Supply and erection of (*a*) 60 reinforced concrete street lighting columns, (*b*) 60 enclosed lanterns with 140 W sodium vapour discharge lamps, (*c*) supply laying and jointing of 5,000 yd of underground cables with switchgear. Cyril Cooper, Borough Engineer, Comforts Ave., Scunthorpe.

Aug. 12.—Southport T.C. Supply and erection of five sets of electrically driven (automatically operated) axial flow pumps of a total capacity of 31,250 gallons per minute. Borough Engineer, Town Hall, Southport. Deposit £2 2s.

Aug. 18.—Belfast. Two vertical axial flow circulating water channel pumps to pump 24,000 g.p.m. at a head of approx. 13 ft. also crane and channel pumphouse equipment for Harbour power station. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. (See our July 13 issue.)

Aug. 30.—Dublin. (a) Two (or three) 6-ton electric portal wharf cranes, and (b) two 10-ton electrical portal wharf cranes for Dublin Harbour. Engineer's office, Dublin Port and Docks Board, East Wall Road, Dublin. Deposit £5.

No date stated.—Swansea T.C. Electrical installation at New

Cockett modern secondary school. Borough Architect, Guildhall, Swansea. (Applications by August 5). Deposit £2. Advertised in this issue.

No date stated.—East Retford T.C. Provision and erection of columns and equipment in connection with a Group A lighting scheme along approx. 2¼ miles of trunk road, A1. Scheme includes both fluorescent and sodium lanterns. H. W. Gilman, Borough Engineer and Surveyor, Municipal Offices, Retford.

No date stated.—Cumnock and Holmhead T.C. Electrical work for 30 houses at Glebe site. R. O. Hunter, Town Clerk.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

July 27.—Montevideo. Supply of one power transformer of 500 kVA. Administracion Nacional de Combustibles, Alcohol y Portland. B.o.T. (Ref. CRE (IB) 584727/50).*

July 31.—Uganda. L.V. (mineral insulators) cable installation complete with accessories including erection and connecting up of switchgear and motor starters (supplied under separate contract) for Tororo cement works. Kennedy and Donkin, Alliance House, 12 Caxton Street, Westminster, S.W.1. (See our July 6 issue.)

Aug. 1.—Luxembourg. One high power X-ray diagnosis generator of six kenotrons, functioning on 3-phase current, 380 V, 50 periods, with its control post equipped with four using stations. One X-ray diagnosis apparatus (motor tip-up table) for radioscopy and radiography. One vertical sterio-radiography apparatus with automatic release. One stereoscope. One tomograph. Bulbs: turning anode with double focus for the different kinds of apparatus. Ministry of Public Health, 57 Boulevard de Stalingrad, Luxembourg. B.o.T. (Ref. CRE (IB) 57699/50).*

Aug. 2.—Damascus. P.V.C. sheathed cables, jumper wire, and distribution boxes. Director-General of the Syrian Posts, Telephones and Telegraphs Dept. of the Ministry of Communications, Damascus. B.o.T. (Ref. CRE (IB) 58810/50).*

Aug. 4.—Karachi. Lead-covered cable to B.S.S. 7 required at Lahore, Dacca and Rawalpindi. Director-General of Supply and Development, Frere Road, Karachi. B.o.T. (Ref. CRE (IB) 59266/50).*

Aug. 5.—Cape Town. E.H.T. switchgear, tripping battery equipment, reactors, e.h.t. and l.t. cable and boxes, welder, h.d.b.c. wire, etc., for a new main distribution sub-station; secondary sub-stations and general distribution extensions. Electricity Dept., Municipality of Worcester, South Africa. B.o.T. (Ref. CRE (IB) 58125/50).*

Aug. 9.—Uruguay. Ordinary monophase meters for 220 V 2,000 meters of 15 amp; direct 3-phase meters of 2 systems wattmeters for 220 V; 2,000 meters of 3×10 A, 1,500 meters of 3×25 A, 500 meters of 3×50 A, 250 meters of 3×75 A, 150 meters of 3×100 A. Three-phase high precision meters of 2 systems wattmeters with 2 constant current transformers: 50 meters of 200/5 A, 50 meters of 300/4 A, 30 meters of 500/5 A, 30 meters of 750/5 A, 40 meters of 1,000/2,000/5 A. Spare parts. Usinas Electricas y Telefonos del Estado, Montevideo. B.o.T. (Ref. CRE (IB) 57616/50).*

Aug. 10.—Mysore. Two 110/4·6-13·8/33-66 kV, three winding transformers, rating 6,000 kVA with lightning arresters on the transformer. One 33 kV star/115 V star, 115 V delta, 500 VA with limiting resistance and fusible disconnectors. B.o.T. (Ref. CRE. (IB) 57694/50).*

Aug. 11.—Wellington. Four oil-circuit breakers 11 kV, 50 w, 3-phase indoor. Electricity Department, Invercargill City Council, New Zealand.

Aug. 16.—Madras. Four 300 kVA single-phase, 25 c/s, oil-immersed, self-cooled, cone-type, double-wound transformers. Stores Purchase Committee, Government of Mysore, Bangalore. B.o.T. (Ref. CRE (IB) 58649/50).*

Aug. 17.—Brisbane. Ten-inch disc type insulators and insulator iron work for use on the 110 kV and 33 kV o.h. transmission lines of a 3-phase, 50 c/s system Secretary, City Electric Light Co. Brisbane. B.o.T. (Ref. CRE (IB) 59150/50).*

Aug. 24.—Brisbane. 44 kV, 3-phase, 50 c/s, automatic out door type switchgear: 6 800A oil circuit-breakers of 750 MVA-

Your Queries — Answered

"Constead" fluorescent lighting unit, makers of? W.S.—Concordia Transformer Co., Sanatoria Road, Cardiff. (18428)

"Lowne" clocks, makers of? T.E.—Lowne Electric Clock and Appliance Co. Ltd., Boones St., London S.E.13. (18433)

"Escolite" glassware, makers of? E.C.—Edison Swan Electric Co. Ltd., Harcourts Division, 155 Charing Cross Road, London W.C. (18442)

"Atmozon" sprayer, makers of? T.E.—Silten Ltd., 34 Batterdale, Hatfield. (18448)

"Permanoid" sleevings, makers of? T.E.—Associated Technical Manufacturers Ltd., Vincent Works, New Islington, Manchester. (18453)

"Icall" hairdryers, makers of? W.W.—These were made by I. Calvete Ltd., who are no longer manufacturing electrical appliances. Enquiries regarding repairs should be sent to Eugene Ltd., Eugene Works, Edgware Road, London N.W.9. (18438)

"Utilair" fan, makers of? T.E. — Utilities (London) Ltd., 435/437 Brixton Road, London S.W.9. (18456)

"Diamond" percolators, makers of? T.E.—London Aluminium Co. Ltd., Westwood Road, Witton, Birmingham 6. (18461)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWER WANTED

"W" in a triangle, low voltage-200 v to 6 v transformer, makers of? N.E. (18466)

rupturing capacity for the control of alternators; 5 similar for station transformers, 6 for station interconnectors; 8 for feeders; and spares for all equipment. City Electric Light Co., Brisbane. B.o.T. (Ref. CRE (IB) 59152/50).*

Aug. 28.—Wellington. Four hundred switchboard lamps, B.P.O. No. 2, 4 V, specification British G.P.O. D1524b. Director General (Stores Division), G.P.O., Wellington, C.1.

Aug. 31.—Brisbane. 6,600 V and 415 V, 3-phase, 50 c/s metal-clad single busbar, indoor switchgear. City Electric Light Co., Brisbane. B.o.T. (Ref. CRE (IB) 59116/50).*

Aug. 31.—Northern Rhodesia. Supply of material required for extensions to the electricity undertakings distribution network in accordance with specification N.5/1950 Ndola Municipal Council, N. Rhodesia.

Aug. 31.—Johannesburg. Thirteen vertical boring and turning mills, electrically driven for S. African Railways. (Tender No. G.1307). Chief Stores Superintendent, Room 405, Park Chambers, Rissik Street, Johannesburg.

Sept. 7.—Johannesburg. Three electrically driven axle box milling machines for S. African Railways. (Tender No. G.1469). Chief Stores Superintendent, Room 405, Park Chambers, Rissik St., Johannesburg.

Sept. 7.—Brisbane. Supply of 33 kV impregnated, paper-insulated, metallic screened, lead covered cables and pilot cables. City Electric Light Co. Ltd., Boundary St., Brisbane. B.o.T. (Ref. CRE (IB) 59151/50).*

Sept. 14.—Wellington. 736 suspension strings of e.h.t. insulators, each string comprising 8 units 5 in. by 10 in., 10,000 lb. M. and E. rating, 1 hook for attachment, 1 socket eye for attachment to cable clamp and 162 strain clamps. B.S.S. 137/1941 refers. Stores Manager, New Zealand State H.E. Commission, Wellington.

Sept. 19.—Johannesburg. 88 kV o.h. transmission lines. Merz and McLellan, Carliol House, Newcastle-upon-Tyne 1.

Sept. 25.—Wellington. Three 11-1 kV automatic voltage regulators, 50 c/s, for electricity dept. (Contract No. 581). Electricity House, Cuba Street, Wellington.

Sept. 28.—Johannesburg. One 12½ in. centre lathe (Tender No. G.1532) and seven capstan lathes (Tender No. G.1483), all electrically driven with geared headstock for S. African Railways. Chief Stores Superintendent, Room 405, Park Chambers, Rissik St., Johannesburg.

Sept. 29.—Wellington. Two electric motor-driven sewage pumps and fittings for station No.18. Motors must comply with B.S.S. No. 168 of 1936. Town Clerk, Wellington City Council. Deposit £25; bond £50.

Oct. 3.—Tangier. Two generating sets of 2,500 kW at Mogoga station for Regie des Services de l' Eau et de l' Electricitie. Direction de la Regie, Rue Vermeer, Tangier.

Oct. 5.—Johannesburg. Two cold sawing machines, each electric-motor driven, for S. African Railways. (Tender No. G.1488). Chief Stores Superintendent, Room 405, Park Chambers, Rissik St., Johannesburg.

PRICES OF CABLE METALS AND OTHER MATERIALS

(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	186 0 0	£180 0 0
Delivered in 2nd and 3rd month after order	187 10 0	—
Delivered in 4th, 5th and 6th month after order	189 0 0	—
LEAD, good soft pig (foreign)	96 0 0	96 0 0
" " " "English" quality	190 10 0	—
Delivered in 2nd and 3rd month after order, plus	1 0 0	—
TIN (99-99.75%) (Cash)	680-682	—
" (3 months)	680-681	—
ALUMINIUM, commercial purity (del.)	112 0 0	—
ZINC	127 10 0	126 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	40 0 0	—
Mild Steel Tape (0.04 in.)	26 0 0	—

CONTRACTS PLACED

L.C.C. Installation of electricity in 268 flats in Duke's Court and York Street dwellings, Westminster, and Shelton Street dwellings, Holborn. Arthur Scull and Son, Ltd.

Eston U.D.C. Erection of street lighting units. G.E.C. Ltd., £2,609.

Pickering U.D.C. Electrical wiring of 78 houses. G. S. Robinson.

TRADE NOTES

Agent Appointed.—B. and H. (Nottm.) Ltd., makers of "Bermex" switch fuse gear and accessories, have appointed James Clegg, 59 Rotherwood Avenue, Glasgow, W.3, to act as sole agent for Scotland.

Barries Electrical Agencies Ltd., who already act as agents for Messrs. Reeves and Co. (Birmingham) Ltd., manufacturers of brass lampholders, switch plugs, etc., have now been appointed sole agents for Northern and Southern Ireland.

Company Formed.—Richard Thomas and Baldwins Ltd. and the Steel Company of Wales Ltd. announce the formation of a company, R.T.S.C. Exports, Ltd., to handle export sales of mild steel flat-rolled products manufactured by them and their subsidiaries. Directors of the new company are Mr. H. S. Spencer (chairman), joint assistant managing director of Richard Thomas and Baldwins Ltd., and Mr. E. Julian Pode, managing director of the Steel Company of Wales, Ltd. The secretary is Mr. J. Idris Roberts, and the registered office is at 47 Park Street, London, W.1.

New E.W.F. Member.—A. W. Gordon Ltd., 11 Gloucester St., Belfast, has been elected a member of the Electrical Wholesalers Federation as from July 13.

New Premises.—Pyrotenax Ltd. announce the opening of office premises at 40 St. Enoch Square, Glasgow (Telephone: Central 2238), under the management of Mr. D. Maclachlan. Instruction on sealing and installation methods is available to customers' electrical staff in the demonstration dept., where the properties and applications of "Pyrotenax" cable and accessories are shown.

Summer Holidays—Gillott Electro Steam Cookers, Ltd., works and offices will be closed from July 29 to August 8. A skeleton staff will, however, deal with urgent correspondence.

BUSINESS PROSPECTS

HOME

Accrington T.C. Borough engineer to arrange for installation of new electrical wiring and fittings at the Market Hall.

Bangor. Construction of arts and crafts block at Normal College, Bangor, for North Wales Counties Training College. Architects, C. W. Glover and Partners, 54 Victoria Street, S.W.1.

Blackpool T.C. Electrical Services Committee has approved the carrying out of the full scheme for the floodlighting of premises on the Promenade during the Autumn illuminations. Estimated cost £55,000.

Blackpool T.C. Erection of special school at Bispham Road, Carleton. Borough Surveyor, A. Hamilton, Municipal Buildings, Blackpool.

Bournemouth T.C. Beach and Pavilion Committee recommends that borough engineer be authorised to invite quotations for the provision of two new lifts with capacity for 20 persons and for 30 persons.

Bradford T.C. Erection of Eccleshill North infants school (240 children). City Architect, Town Hall, Bradford.

Bucklow R.D.C. Erection of 14 houses at Marthall Lane, Ollerton. Engineer and Surveyor, H. V. Shaw, 26 Station Buildings, Altrincham.

Cannock R.D.C. Erection of 44 houses. J. P. Roberts, Clerk Council Offices, Penkridge, Staffs.

Chester T.C. Erection of two-stream infants school at Blacon. C. Greenwood, Engineer and Surveyor, Municipal Offices, Chester.

Durham T.C. Received sanction from M.o.H. to spend £4,123 on improved street lighting at North Rd., Gilesgate, and Sherburn Rd.

Farnham U.D.C. Construction of 24 houses on Weydon Lane site. Architects, Gilbert and Hobson, Lloyds Bank Chambers, 75 Castle Street, Farnham.

Haddington T.C. Erection of 28 houses (including electrical work) at Caponflat. J. A. W. Grant, Architect, 20 St. Andrew Square, Edinburgh.

Halifax T.C. Erection of J. H. Whitley county secondary modern school. Borough Engineer, Crossley St., Halifax.

Haltwhistle R.D.C. Erection of 44 houses at Halton-Lea-Gate. Surveyor, Council Offices, Haltwhistle.

Herts C.C. Erection of London Colney, Sheldon Lane, one-form entry J.M.I. school. County Architect, Hertfordshire C.C. County Hall, Hertford.

Hinckley U.D.C. 144 houses are to be built by Hinckley and District Building Trades Employers' Association at a cost of £180,288.

Hoole T.C. Sanitary and Highways committee decided on scheme for erection of 69 concrete columns with enclosed type lamps on Hoole road in substitution for the existing gas lighting. Estimated cost £3,769.

Lichfield T.C. Erection of 24 dwellings on Wheel Lane estate. Leslie Straw, Engineer and Surveyor, The Guildhall, Lichfield.

Littlehampton U.D.C. M.o.H. authorised installation of promenade lighting scheme at estimated cost of £2,365.

Liverpool T.C. Recommended to approve conversion of automatic traffic control signals at Islington-Norton St. junction to "vehicles actuated type," at an estimated cost of £1,500; and erection of automatic traffic control signals at Scotland Rd.-Ellenborough St. and Scotland Rd.-Cazneau St., £2,000 and £2,500 respectively.

Maidenhead T.C. Erection of 42 dwellings at Curls Lane estate. C. T. Read, Borough Engineer and Surveyor, 14 Crawford Rise, Maidenhead.

Manchester T.C. Recommended to approve installation of electricity in Granville Place Dwellings, Pollard St., Ancoats. Estimated cost £3,243.

Northampton T.C. Recommended to authorise the borough architect, in conjunction with a consultant, to prepare detailed specifications for the lighting of the Central Library, and to invite tenders for the carrying out of the work.

North Riding E.C. Erection of new county infants school at Grangetown, near Middlesbrough. F. Barraclough, Secretary, Education Offices, County Hall, Northallerton.

Norwich T.C. Erection of 36 flats at Hall Road. City Architects, City Hall, Norwich.

Ploughley R.D.C. Erection of 10 houses at Upper Heyford. F. E. Openshaw, Oxford Allied Architects, 65 St. Giles Street, Oxford.

Preston T.C. Erection of 98 houses on Ribbleton Hall estate. Borough Surveyor, Municipal Building, Preston.

Ramsbottom U.D.C. Erection of 28 flats in 5 blocks at Garnett Street. Engineer and Surveyor, Council Offices, Ramsbottom.

Rowley Regis T.C. Erection of 32 flats off Hanover Road, Throne Road estate. Borough Engineer and Surveyor, Municipal Buildings, Old Hill.

Scarborough T.C. Finance Committee approved proposal submitted by the borough engineer for the provision of automatic passenger lift at Town Hall. Estimated cost of £2,394.

South Shields T.C. To obtain tenders for renewal of electrical installation at Dean Rd. county secondary school.

Sunderland T.C. Received M.o.H. sanction to borrow £593,793 for erection of 466 houses on Pennywell estate and £155,383 for another group of 126 houses on same estate.

Surbiton T.C. Highways Committee reports that the Minister of Transport has decided to install lighting schemes at the undermentioned roundabouts and junctions on the Kingston By-Pass road: (1) Roundabout at Tobey Jug Hotel, ten 140 W sodium lamps; (2) Roundabout at the Ace of Spades, six similar lamps; (3) Roundabout at the southern end of the By-Pass, Esher; (4) Roundabout at Malden Rd. junction; and (5 Robin Hood Gate junction.

Tynemouth T.C. New tenders are to be considered for electric wiring of 36 houses at Marden South in place of withdrawn tender.

Wellingborough U.D.C. To build 16 old people's houses on the Croyland Hall Estate (£17,031); 20 houses at Haydon Avenue, Finedon (£27,900); and 10 houses in Stanwell Way and Second Avenue, Finedon (£15,277).

Whitley Bay U.D.C. Considering a £4,000 estimate by N. E. Board for lighting promenade.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Lincoln Batteries. General meeting of members at "Trimsaran," London Rd., Leigh-on-Sea, Essex, on August 12 at 11 a.m. to receive liquidator's account of winding-up.

Swaning Electrical Co., Ltd. In the Companies Court last week, Justice Vaisey made an order for the compulsory winding up of the company on a creditor's petition for a debt of £147 and costs. There was no opposition.

Voluntary Liquidation

Thomas Duncan Ltd., wholesale electrical distributors, 135 East Street, London, N.1. At a recent meeting of creditors, a statement of affairs showed liabilities amounting to £1,315, of which £1,227 was due to trade creditors. Assets were estimated to produce £803, and after allowing £46 for preferential claims, there were net assets of £757, or a deficiency as regarded creditors of £558. Issued capital of the company totalled £800 and, so far as the shareholders were concerned, there was a total deficiency of £1,358.

The company was registered on November 1, 1947, with a nominal capital of £1,000, and had carried on business as factors of electrical goods. Trading figures for the year ended October 31, 1948, disclosed sales of £5,655 with a gross profit of £1,224 and there was a net profit of £66. In the following year, the sales increased to £8,308 and there was a gross profit of £1,874, but after allowing for overhead expenses, depreciation, directors' remuneration and other charges, there was a debit balance on the profit and loss account of £410. Accounts prepared for the period November 1, 1949, to July 8 last, showed sales of £4,508 and a total loss of £1,233.

A resolution passed confirmed the voluntary liquidation of the company with Mr. Percy Phillips, of 76 New Cavendish Street, London, W.1 as liquidator. A committee of inspection was also appointed.

Miller-Hepworth Ltd. Resolution for voluntary winding up passed at meeting on July 11. James Moss, 28 Queen Street, Manchester 2, appointed liquidator.

E. Clarke (Electrical) Ltd. Meeting of creditors at offices of John Potter and Harrison, 22 Birley Street, Blackpool, at 2.30 p.m. on July 27.

Intended Dividends

F. G. Blogg and Co. Ltd., radio and electrical engineers, 24 John Street, Bedford Row, W.C.1. Last day for receiving proof, July 28. Liquidator, N. G. Randall, of Albert A. Henley and Co., 19-20 Grosvenor Place, S.W.1.

Round and Green (Birmingham) Ltd., manufacturers and dealers in electrical goods of 564a Stratford Road, Shirley, Birmingham. Last day for receiving proofs, August 17. Liquidator, G. A. Clifford, 28 Waterloo Street, Birmingham 2.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

B.I.. Monogram. 672,314. Class 9. Radio and television amplifiers, suppressors, aerials, terminals and plugs, connectors, fuses and fuse holders, radio-valve holders, thermal delay switches, lightning arresters and transmission lines for television aerials. Belling and Lee Ltd., Cambridge Arterial Rd., Enfield, Middx.

Creda Comet. 687,840. Class 11. Electric cooking stoves. Simplex Electric Co. Ltd., Broadwell Rd., Oldbury, Birmingham.

Hyflo. 680,118. Class 9. Electric make and break switches. Aldborough Kingsley Williams, Victory Works, Newbold Rd., Chesterfield.

Silvercrown, with design. 678,916. Class 7. Dynamos, polishing machines, centrifugal drying machines and filters. Silvercrown Ltd., 5 Lauriston Rd., London S.W.19.

Silverson. 676,240. Class 7. Machines for mixing, filling, emulsifying, straining and pumping. Silverson Machines (Sales) Ltd., 11/12 Finsbury Square, London E.C.2.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

E. R. Electrics, Ltd. 141 Wembley Park Drive, Wembley, Mdx. Mnfrs. of and dlrs. in gramophones, sound reproducing machines, television apparatus, etc. Cap.: £500. Dirs.: Mrs. C. S. Read, A. J. Elliott.

F. Clulee and Sons, Ltd. 46 Birmingham Rd., Alcester. Mech., elec., constructional, marine, motor, heating and ventilating engrs., etc. Cap.: £1,000. Dirs.: F. B. Clulee and Emily E. Clulee, C. F. Clulee, and S. P. Bastow.

J. W. Atkinson (Contractors) Ltd. Pack Horse Yard, Briggate, Leeds 1. To take over bus. of a plumber and elec. engr. cd. on as "J. W. Atkinson" at Briggate, Leeds. Cap.: £1,000. Dirs.: F. Atkinson and I. Benson.

Marshalls (E.M.E.) Ltd. 5 Willow Hall Lane, Sowerby Bridge, Yorks. Genl. mech., motor and elec. engrs., etc. Cap.: £100. Dirs.: W. J. S. Marshall and P. Marshall.

S.R.M. Television, Ltd. Cap.: £10,000. Dirs.: J. Stubbs, Greystones, Main St., Thurmaston, Leics., and D. Turner.

MEETINGS TO NOTE

MONDAY, JULY 24

SIXTH INTERNATIONAL CONGRESS OF RADIOLOGY EXPOSITION. Exhibition at Horticultural Hall, Westminster. (Open until July 28.)

TUESDAY, JULY 25

INST. PHYSICS (Industrial Radiology group).—Summer meeting (until July 28). New Horticultural Hall, Victoria, S.W.1.

MONDAY, AUGUST 28

SUBMARINE CABLE CENTENARY.—Exhibition opens at Science Museum, South Kensington, London.

WEDNESDAY, AUGUST 30

BRIT. ASSN.—Annual meeting. Birmingham.

TUESDAY, SEPT. 5

SCIENTIFIC INSTRUMENT MANUFACTURERS' ASSN.—Annual exhibition and symposium (until Sept. 8). Examination Hall, Queen Square, W.C.1.

WEDNESDAY, SEPT. 6

RADIO INDUSTRY COUNCIL.—Radio and television exhibition (until Sept. 16). Castle Bromwich, Birmingham.

MONDAY, SEPT. 18

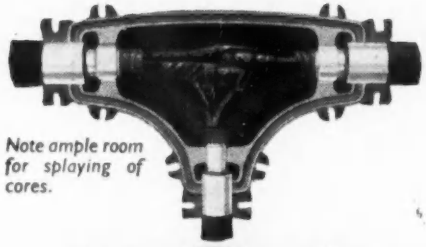
INTER. MECH. ENGRG. CONGRESS.—(Until Sept. 23). Brussels.

ASSN. PUBLIC LIGHTING ENGRS.—Annual meeting and conference (until Sept. 23). Winter Gardens, Bournemouth.

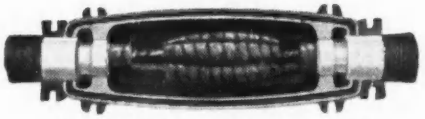
TUESDAY, SEPT. 26

SYMPOSIUM ON INFORMATION THEORY.—(Until Sept. 29). Royal Society, Burlington House, Piccadilly, W.1.

BOXES YOU CAN BURY AND FORGET



Note ample room for splaying of cores.



Completed Multicore Joint (above) and Box with top half in position (below).

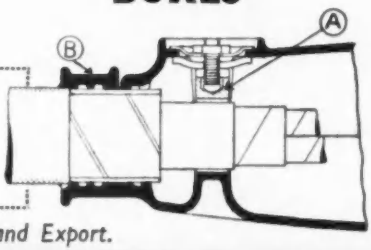
The design of HENLEY "Cablegrip" type Boxes is based on years of experience of practical jointing conditions, and incorporates all those features which facilitate jointing operations. Their complete reliability bears out our claim for these boxes—that you can "*bury and forget.*"

The range of "Cablegrip" type boxes include Straight Through, Service and Branch Boxes for underground installation. The "Cablegrip" gland and armour clamp, which is a feature of the boxes, is illustrated below.

HENLEY

"CABLEGRIP" STRAIGHT THROUGH SERVICE & BRANCH BOXES

The "Cablegrip" gland and armour clamp provides two wide bearings for the cable. A highly efficient bond to the lead sheathing is effected by means of a cast iron shuttle (A) and to the armouring by means of a cast iron armour clamp (B).



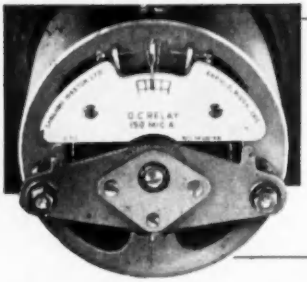
Available for Home and Export.

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD.
51–53, HATTON GARDEN, LONDON, E·C·1

FEATURES OF WESTON SUPERIORITY

Weston
MOVING COIL RELAYS

This modern range of relays is ideal for all Laboratory or Industrial Purposes. Built on the permanent-magnet moving coil principle, unaffected by external magnetic fields, the precious metal contacts will not oxidise or tarnish, and the high torque developed ensures positive contact pressure. Supplied in Bakelite casing. Most applications call for special requirements and enquiries should therefore enclose a diagram of the circuit to be closed and state (a) High and/or low contact adjustment; (b) mounting position; (c) resistance; (d) values of current and voltage in local circuit and whether DC or AC; (e) values of resistance and any inductance or capacitance in local circuit; and (f) any special accuracy required. Every 'Weston' relay is specially designed to give the best possible performance for its individual purpose. (The Model illustrated is S54.)



ACCURACY OF ADJUSTMENT. Special note should be made of the reduction gearing which enables the *user* to make accurate adjustment with absolute ease. The accuracy and rigidity of the mounting ensures constant centring after adjustment. Yet another special 'Weston' feature.

SANGAMO WESTON LIMITED

ENFIELD, MIDDLESEX: Telephone: Enfield 3434 (6 lines) & 1242 (4 lines) Telegrams: Sanwest, Enfield.
DEPOTS AT GLASGOW, NEWCASTLE-ON-TYNE, LEEDS, MANCHESTER, WOLVERHAMPTON, BRISTOL, LIVERPOOL, NOTTINGHAM, SOUTHHAMPTON, IPSWICH AND BRIGHTON.

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

COUNTY BOROUGH OF SWANSEA

New Cockett Modern Secondary School

TENDERS FOR ELECTRICAL INSTALLATION

ELECTRICAL ENGINEERS wishing to tender for the Electrical Installation at the New Cockett Modern Secondary School, now in course of erection at Cockett, Swansea, are invited to submit their applications to the Borough Architect, Guildhall, Swansea, on or before August 5, 1950.

Plans, specification and Conditions of Contract can be obtained on application and deposit of Two Pounds, provided applicant gives satisfactory evidence of having previously carried out work of a similar character.

The deposit will be refunded after delivery of a bona-fide tender (which is not subsequently withdrawn) and the return of all documents.

No guarantee is given that the lowest or any other tender will be accepted.

T. B. BOWEN,
Town Clerk.

Guildhall, Swansea.
July 14, 1950. (F 429)

CITY OF MANCHESTER

THE Wythenshawe Estate Committee invite tenders for the electrical installations at 10 shops, maisonettes and garages at Woodhouse Park South-west Sub-centre, Portway, Wythenshawe, and 10 shops, maisonettes and garages at Wodehouse Park South-east Sub-centre, Portway, Wythenshawe.

Specifications and drawings may be obtained at the office of the City Architect, Town Hall, upon payment of £1 1s. each, which sum will be returned upon receipt of bona-fide tenders. All cheques and postal orders are to be made payable to the order of "The Corporation of Manchester" and crossed.

Sealed tenders, enclosed in the official envelope, to be delivered at the Town Hall, not later than 10 a.m. on Monday, July 31, 1950.

PHILIP B. DINGLE,
Town Clerk.

Town Hall, Manchester.
July, 1950. (F 397)

APPOINTMENTS VACANT

SOUTH EASTERN ELECTRICITY BOARD

Central Sussex District, Haywards Heath

(FITTER ELECTRICAL)

WAGES 2/11 per hour for 44-hour 5-day week under the N.J.I.C. Agreement for manual workers in the electricity supply industry. Applicants must have had experience of maintenance and erection of h.v. and l.v. switchgear and transformers.

Applications, giving two referees, must reach A. M. Harker, Esq., Central Sussex Manager, South Eastern Electricity Board, Electra House, Church Road, Haywards Heath, by July 31, 1950.

A. L. BURNELL,
Secretary.

July, 1950. (F 433)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

BRITISH ELECTRICITY AUTHORITY

South Western Division

ELECTRICAL DRAUGHTSMAN
DIVISIONAL HEADQUARTERS, BRISTOL

APPLICATIONS are invited for the appointment of an Electrical Draughtsman in the Transmission Construction Department at Divisional Headquarters, South Western Division, Bristol.

The salary will be within the range £350 to £550 per annum, according to experience and qualifications. The commencing salary will be fixed within the above range and regarded as provisional pending negotiations between the Authority and the appropriate organisations.

Duties will be largely concerned with the preparation of layout and site drawings for outdoor high-voltage substations under construction or in the project stage. Applicants must have had experience in the layout of 132-kV and or 33-kV outdoor substations and their associated equipment. Some experience in building and site works would be an advantage, but is not essential.

Applications, stating age, qualifications, and details of experience, should be sent to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Bristol 8, to arrive not later than the first post on Monday, August 14, 1950.

R. C. BARRETT,
Divisional Secretary.

July 14, 1950. (F 434)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the position of SENIOR AUDIT ASSISTANT at Divisional Headquarters.

Applicants should have experience of audit work in large undertakings and should hold recognised accountancy qualifications. Experience in the electrical industry would be advantageous.

The salary will be in accordance with the N.J.C. Salary Agreement Grade 4, £510–£570 per annum, and the post will be superannuable.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, at the undermentioned address and returned to him not later than July 31, 1950.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate, Nottingham. (F 337)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPOINTMENT OF COMMERCIAL ASSISTANT

APPLICATIONS are invited for the appointment of Commercial Assistant (male) in the Blaenau Ffestiniog District of the No. 4/5 Sub-Area of the Board at a salary within the range £450-£500 per annum, according to qualifications and experience. The salary is provisional and subject to any adjustments later to be agreed after negotiation with the appropriate staff organisation.

The person appointed will be directly responsible to the District Commercial Officer, Caernarvon, and the duties attached to the position will include the general organisation of the service centre, dealing with consumers' queries and correspondence, preparation of estimates for installation and contracting work, and general work of a commercial nature, including the detached supervision of contracting staff and negotiations relating to a small d.c./a.c. changeover project. Ability to speak Welsh would be an added qualification.

The successful candidate may be required to satisfy the Board's medical adviser and, if eligible, will be required to contribute to a superannuation scheme.

Applications, on forms to be obtained from the Manager, No. 4 Sub-Area, Merseyside and North Wales Electricity Board, Electricity House, Rhostyllen, near Wrexham, should be completed and returned to him not later than July 31, 1950.

JAMES RANKIN,
Secretary.
(F 435)

NORTH WESTERN ELECTRICITY BOARD

No. 3 Sub-Area

ASSISTANT TO SECTION HEAD—POWER SALES

APPLICATIONS are invited for the appointment of Assistant to Section Head, Power Sales, in the Sub-Area Consumers' Engineer's Section at No. 3 Sub-Area Headquarters, Union Street, Oldham.

The salary will be in accordance with the National Joint Board Schedule, Class "J," Grade 7, i.e. £736-753-770 per annum. The post is superannuable.

Applicants should have some mechanical engineering experience in addition to training and experience in electrical engineering. A knowledge of the economics of power production and ability to draft proposals for the conversion of textile factories from steam to electric drive is desirable.

Corporate membership of the Institution of Electrical Engineers and or the Institution of Mechanical Engineers will be an advantage.

Applications, stating age, experience and qualifications, present position and salary, should be received by E. Binns, Esq., M.I.Mech.E., A.M.I.E.E., Sub-Area Manager, The North-Western Electricity Board, No. 3 Sub-Area, Greenhill Offices, Oldham, not later than Saturday, July 29, 1950. (F 412)

MIDLANDS ELECTRICITY BOARD

Shropshire and Herefordshire Sub-Area

APPOINTMENT OF DISTRICT ENGINEER

APPLICATIONS are invited for the position of District Engineer in the Shrewsbury District of the above Sub-Area.

Applicants must have had considerable experience in all branches of distribution work, including the operation and maintenance of high and low voltage cables, overhead lines, substations, protective gear, etc. Candidates with appropriate technical qualifications will be preferred.

The conditions of service will be in accordance with the National Joint Board Agreement and the provisional salary, subject to negotiation, will be £867 per annum.

Applications, giving full details of experience and qualifications, should be endorsed "District Engineer" and forwarded within 14 days to: Mr. W. Winwood, Manager, Shropshire and Herefordshire Sub-Area, Spring Gardens, Ditherington, Shrewsbury.

A. STEPHENS,
Secretary.
(F 389)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the position of POWER STATION SUPERINTENDENT at the new Agecroft Generating Station.

Applicants should be fully qualified Engineers, having had a technical education and practical experience in the administration, operation and maintenance of a modern steam generating station. They should preferably be Corporate Members of the Institution of Mechanical Engineers, or of the Institution of Electrical Engineers, or have equivalent qualifications. A knowledge of P.F. fired high pressure boilers would be an advantage.

The present capacity of the station is two 52·5 MW sets and the salary will be in accordance with Class "G," Grade 1, of the Revised N.J.B. Schedule, i.e., £1,069-£1,119 per annum.

The ultimate capacity of the Station will be 210 MW.

Applications, stating age, qualifications, present position, and giving full details of education and experience should be received by The Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than July 28, 1950. (F 391)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointments:

JUNIOR ENGINEERS—Little Barford Generating Station.

Salary in accordance with Clause 35 of the revised N.J.B. Schedule, Class "G," minimum Grade 16, £375 per annum to maximum Grade 14, £412 per annum.

Preference will be given to applicants who have had previous experience in a generating station and who have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than July 28, 1950. Envelopes should be endorsed "Junior Engineer—Little Barford."

W. N. C. CLINCH,
Controller.
Northmet House, Southgate, N.14. (F 394)

SOUTHERN ELECTRICITY BOARD

No. 3 (Portsmouth) Sub-Area

ASSISTANT ENGINEERS, ALDERSHOT DISTRICT

APPLICATIONS are invited for the positions of two Assistant Engineers in the Aldershot District (Petworth Branch) of the No. 3 (Portsmouth) Sub-Area. The salaries, which are provisional and subject to adjustment by the appropriate negotiating machinery, will be £475 and £450 per annum respectively, depending upon qualifications and experience. N.J.B. conditions of service.

Candidates should have experience in the design, construction, operation and maintenance of h.v. and l.v. overhead and underground distribution systems, substation plant and distribution equipment, and possess suitable technical qualifications.

The successful applicants will, subject to certain conditions, be required to contribute to the staff superannuation scheme, membership of which is compulsory.

Applications, on forms to be obtained from the Sub-Area Secretary, should be submitted to him at Lower Drayton Lane, Cosham, Portsmouth, in envelopes endorsed "Assistant Engineer, Aldershot," within fourteen days of the publication of this advertisement. (F 395)

SOUTHERN ELECTRICITY BOARD

SECTION HEAD IN CHIEF COMMERCIAL OFFICER'S DEPARTMENT

APPLICATIONS are invited for the position of Section Head in the Chief Commercial Officer's Department at Southern Electricity House, Maidenhead.

The successful applicant will require to be fully conversant with tariffs, sales and contracting and other associated matters.

The provisional salary, which is subject to adjustment by the appropriate negotiating machinery, will lie within the range £1,200-£1,500 p.a., according to experience and ability.

The successful candidate will, if eligible, be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme.

Applications should be made on a standard form, obtainable from the Secretary and returned to him at Southern Electricity House, Littlewick Green, Maidenhead, Berks, not later than Friday, August 4, 1950.

F. W. KEMPTON,
Secretary.
(F 413)

NORTH WESTERN ELECTRICITY BOARD

No. 2 Sub-Area

APPOINTMENT OF ESTATE AND WAYLEAVES ASSISTANTS—SECRETARIAL DEPARTMENT

APPLICATIONS are invited for the appointment of:

(a) An Estate and Wayleaves Assistant at Sub-Area Headquarters, Manchester.

(b) Two Estate and Wayleaves Assistants to operate in the Districts of the No. 2 Sub-Area.

The salaries for the posts will be in accordance with the salary scales of the National Joint Council (Administrative and Clerical Grades), namely:

(a) Grade 3, £450 by £20 to £510 per annum.

(b) Grade 2, £390 by £20 to £450 per annum.

Applicants must have had experience in the negotiation, preparation, completion and registration of Wayleave Agreements. A knowledge of the Electricity Acts, Town Planning law and procedure and estate practice would be an advantage.

Applications, stating age, qualifications, experience, present position and salary, and post applied for, should be received by E. G. Wardle, Esq., A.M.I.E.E., Manager, No. 2 Sub-Area, The North-Western Electricity Board, National Buildings, St. Mary's Parsonage, Manchester 3, not later than Saturday, July 29, 1950. (F 411)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the position of DEPUTY STATION SUPERINTENDENT at Farley Generating Station, Reading.

Applicants should preferably be corporate members of a recognised professional institution, and have had a wide experience in the operation, maintenance, and administration of a large modern electricity generating station. The salary will be in accordance with Grade 3, Class "G," of the National Joint Board's Schedule, at present £895-£927 per annum.

Forms of application may be obtained from the undersigned and should be returned not later than August 4, 1950.

P. D. A. OLIVER,
Divisional Secretary.
111 High Street, Portsmouth.
15.7.50. (F 432)

HIS MAJESTY'S COLONIAL SERVICE

A VACANCY exists for an ASSISTANT ENGINEER (Radio) in the Posts and Telegraphs Department, East Africa. The post is on contract for four years in the first instance on gratuity terms. The salary scale is £655 (for two years) to £1,320 per annum with promotion bar £1,140, point of entry depending on age, qualifications and approved war service. Candidates should be not more than 35 years of age, preferably single, and should possess a British University degree in Electrical Engineering, or alternatively, the qualifications required by the Institution of Electrical Engineers for admission to the Grade of Associate Member. They should also have had considerable experience of radio-communications engineering with a manufacturing firm engaged in the production of radio-communications equipment, preferably on the planning and installation of radio stations and or similar experience with the British Post Office.

The duties of the post will involve planning and installation of the control and direction of maintenance of radio equipment stations in East Africa.

Terms of appointment include partly furnished Government quarters, if available, at a rent of 10 per cent. of salary; free passages are provided for officer, and wife, on first appointment and on leave. Children's passages are provided up to the cost of one additional adult passage. Income Tax is at local rates which are very much lower than those in the United Kingdom. The tour of service is for the period of contract. Leave on full salary is granted at the rate of five days for each completed month of resident service.

Candidates who are established officers of the British Post Office should apply through their establishment officer; others should write for a form of application to the Director of Recruitment (Colonial Service), Sanctuary Buildings, Great Smith Street, London S.W.1, quoting reference No. 27326/27. (F 393)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the position of JUNIOR DRAUGHTSMAN at the Mucklow Hill, Halesowen, offices of the Board.

Applicants should be experienced preferably in the Electricity Supply Industry. Duties will include detailing h.v. overhead line pole equipment.

The provisional salary, subject to negotiation with such organisations as may be appropriate, will be £350 per annum.

The successful applicant will be required to contribute to the Board's Superannuation Scheme if eligible.

Applications, stating age, education, qualifications and experience, should be forwarded within 14 days to the Chief Engineer, Midlands Electricity Board, Mucklow Hill, Halesowen.

A. STEPHENS,
Secretary.
(F 408)

SOUTH WESTERN ELECTRICITY BOARD

Bath District

APPOINTMENT OF ASSISTANT DISTRICT ENGINEER

APPLICATIONS are invited for the appointment of Assistant District Engineer, Bath District, with headquarters at Bath, at a commencing salary of £662 per annum (Class "E," Grade 5, of the N.J.B. Schedule).

The successful applicant's duties will include matters relating to preparation of system improvement schemes, capital sanction applications, maintenance of protective gear and fault location, and operation of district transport.

Associate or graduate membership of the I.E.E. would be an advantage.

Applications, giving age, present appointment and salary, and details of qualifications and experience, to be submitted to A. G. Milne, District Manager, Bath, South-Western Electricity Board, The Old Bridge, Bath, within ten days. (F 386)

MIDLANDS ELECTRICITY BOARD

Central Gloucestershire Sub-Area

APPOINTMENT OF ASSISTANT DISTRICT ENGINEER

APPLICATIONS are invited for the above position in the Severn Vale District of the Central Gloucestershire Sub-Area.

Applicants must have had experience in all branches of distribution work, including operation and maintenance of high and low voltage cables, overhead lines, substations, etc. Appropriate technical qualifications will be considered an advantage.

The appointment will be in accordance with N.J.B. conditions and the provisional salary of £465 per annum will be subject to negotiation.

Applications, stating full details of age, qualifications, experience and present salary, should be forwarded within 14 days to: Mr. D. Holt, Manager, Central Gloucestershire Sub-Area, Midlands Electricity Board, 126 London Road, Gloucester.

A. STEPHENS,
Secretary.
(F 430)

SOUTH EAST SCOTLAND ELECTRICITY BOARD

Southern Sub-Area

APPLICATIONS are invited for the following appointments:—

(1) SUB-AREA ENGINEER.

Applicants should be corporate members of the Institution of Electrical Engineers and have extensive experience in the Electricity Supply Industry especially in the design, construction and operation of rural and urban distribution networks comprising underground cable, overhead lines and static substations at voltages up to 33 kV. The person appointed will be responsible to the Sub-Area Manager for the general running of the Engineering Department of the Sub-Area. The commencing salary will be £1,000 per annum and will be provisional pending the negotiation of an agreed scale with the appropriate organisation.

(2) METER ENGINEER.

Applicants should possess the Higher National Certificate in Electrical Engineering or equivalent qualifications and have experience in the organisation and control of a type 'A' polyphase meter testing station. The salary will be that appropriate to Class "G," Grade 7, of the National Joint Board Schedule (£651–£665–£679).

The appointments will be superannuable under the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, giving age and particulars of education, training, experience and positions held, should reach the undersigned not later than fourteen days after the appearance of this advertisement.

G. H. SANKEY,
Sub-Area Manager.

High Street, Galashiels,
Selkirkshire. (F 396)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the position of STATION SHIFT CONTROL ENGINEER at Accrington Generating Station.

The salary will be in accordance with Class "D," Grade 10, of the Revised N.J.B. Schedule, i.e., £465-£481 per annum.

Possession of technical qualifications, and experience in a Generating Station is desirable.

Applications, stating age, qualifications, present position, and full details of education and experience, should be received by The Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than July 29, 1950. (F 390)

NORTH EASTERN ELECTRICITY BOARD

Tyne Sub-Area

APPLICATIONS are invited for the post of HOUSECRAFT ADVISER at Carliol House, Newcastle-upon-Tyne. The duties include organising public demonstrations, taking charge of the Demonstration Kitchen and advising customers on all classes of domestic apparatus. Applicants should hold the certificate of a recognised Domestic Science Training College, the E.A.W. Housecraft Diploma and have had practical experience.

Vacancies also exist for Demonstrators, Assistant Demonstrators and Trainee Demonstrators in the Newcastle-upon-Tyne and Hexham Districts.

Demonstrators should hold a certificate of a recognised Domestic Science Training College, and preferably the E.A.W. Housecraft Certificate, and should have had some practical experience.

Assistant Demonstrators should have some or all of the above qualifications.

Trainee Demonstrators should be women without the above qualifications but with good domestic experience, or should be girls over 16 years of age, preferably with general education up to school certificate standard with an aptitude for domestic work, and to whom some domestic science training would be given. Training in the use of electrical appliance will be given to all grades.

Salaries and conditions will be in accordance with the National Joint Council Agreement for the Electricity Supply Industry.

HOUSECRAFT ADVISER. Grade 2: £390 to £450 per annum.

DEMONSTRATOR. Grade I: £310 to £390 per annum. Annual increments of £20 up to £350. Beyond £350 increments subject to certificate of competence.

ASSISTANT DEMONSTRATOR. Grade S.T. £135 to £335 per annum. Initial salary in accordance with age. Annual increments of £20 subject to certificates of progress.

TRAINEE DEMONSTRATOR. Grade G.C.: £108 to £308 per annum. Initial salary according to age. Increments up to £248 per annum according to age. Increments above £248 per annum according to certificates of progress.

Applications, stating age, education, training and experience, specifying grade, should be sent to the Manager, Tyne Sub-Area, The North Eastern Electricity Board, Osborne House, 80 Jesmond Road, Newcastle-upon-Tyne 2. (F 428)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the following appointments at Poole Generating Station, Hamworthy, Dorset, which, when completed, will be 200 MW (Class H).

(a) DEPUTY STATION SUPERINTENDENT. Grade 3 (£948-£994).

Applicants should have had a wide experience in the operation, maintenance, and administration of an electricity generating station.

(b) OPERATION ENGINEER—EFFICIENCY. Grade 7 (£692-£722).

Responsible for ensuring that all sections of the generating station plant attain efficiency and economy of operation.

(c) OPERATION ENGINEER—TRAFFIC. Grade 7 (£692 to £722).

Responsible for programming of shipment of coal, operation of coal-handling plant, and ash-handling plant, and disposal operations.

(d) FIVE SHIFT CHARGE ENGINEERS. Grade 7 (£692 to £722).

(e) FIVE ASSISTANT SHIFT CHARGE ENGINEERS. Grade 9 (£609-£653).

Applicants should have had previous experience in a large generating station, and preference will be given to candidates who have experience of a modern station with high temperatures and pressures, and pulverised fuel equipment.

(f) CHEMIST. Grade 7 (£692-£722).

Applicants should be fully qualified industrial chemists with practical experience of fuel, water, and oil testing appropriate to modern generating stations. A knowledge of boiler chemistry for high steam pressures and temperatures will be an advantage.

(g) ENGINEERS. Grade 10 (£571-£597).

Five for duties as Station Shift Control Engineers and others to deal with the maintenance of instruments and technical records.

(h) JUNIOR ENGINEERS. Grades 17-14.

For general duties throughout the station, including periods on shift when necessary.

Applicants should have had a thorough technical training, followed by wide experience in the operation and maintenance of generating plant. Preference will be given to candidates in possession of technical qualifications, admitting to corporate membership of a recognised professional institution, and manufacturing works experience will be an advantage.

The salaries mentioned in respect of grades not named in the N.J.B. Agreement are provisional and subject to negotiation through the appropriate machinery.

Candidates should state clearly the post for which they wish to be considered.

Forms of application may be obtained from the undersigned, and should be returned not later than Friday, August 4, 1950.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street, Portsmouth. (F 431)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the position of GENERAL ASSISTANT Engineer in the Planning and Development Section of the Technical Department at Divisional Headquarters.

The post, which is superannuable, is graded within the range £437 to £622 per annum, in accordance with Grade 8 of Schedule C of the Revised N.J.B. Schedule.

Candidates should preferably hold an Engineering Degree, or have attained Higher National Certificate standard. Works experience in switchgear and protection would be an advantage.

Applications, stating age, qualifications, present position, and salary, together with full details of experience, should be received by the Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than July 31, 1950. (F 427)

COUNTY BOROUGH OF BARROW-IN-FURNESS

Borough Engineer and Surveyor's Department

ASSISTANT ELECTRICAL ENGINEER

APPLICATIONS are invited for the permanent appointment of Assistant Electrical Engineer on Grade Va of the National Scales of Salaries for Local Authorities' Staffs.

The duties of the post will include the preparation of plans, specifications and estimates for electrical installations in municipal buildings, and the supervision of work in progress. Comparable experience is essential and some knowledge of street lighting would be an advantage.

Further details of the post, conditions of appointment and forms of application may be obtained from the Borough Engineer and Surveyor, to whom completed application forms must be returned not later than Friday, August 4, 1950. (F 387)

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the appointments of GENERAL ASSISTANT ENGINEER in the Liverpool and Wirral Transmission Sections of this Division. The salary £437-£569 per annum, being Class "AX," Grade 8, of the N.J.B. Schedule.

Applicants should have had experience in the installation and maintenance of h.v. switchgear, overhead lines, cables and transformers, and should preferably be graduate members of the Institution of Electrical Engineers or have equivalent qualifications.

The appointments are superannuable under the British Electricity Authority and Area Boards' Superannuation Scheme and subject to a medical examination.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Merseyside and North Wales Division, Clarke Gardens, Woolton, Liverpool, and should be returned to him not later than Friday, August 4, 1950. (F 409)

ABERDARE CABLES, LTD., Aberdare, require immediately PAPER CABLE ESTIMATOR to handle foreign inquiries and tenders. State age, experience, and salary required. (F 355)

AN interesting opportunity exists for a young and fully qualified ELECTRICAL ENGINEER with knowledge of electronics in connection with servo mechanism development for aircraft.—Write to Mr. G. Orloff, Chief Designer, British Messier, Ltd., Cheltenham Road East, Gloucester. (F 284)

CABLE manufacturers require ELECTRICAL ENGINEER aged about 20, as Technical Assistant in their construction department. Applicants should hold the Higher National Certificate in Electrical Engineering.—Apply in writing, giving particulars of qualifications and experience, to the Staff Officer, W. T. Henley's Telegraph Works Co., Ltd., Milton Court, Dorking. (F 403)

CHECKER DRAUGHTSMAN with wide light engineering experience required.—Write, with full details of career,to Personnel Manager, The Phoenix Telephone and Electric Works, Ltd., The Hyde, Hendon, N.W.9. (F 404)

DESIGNER DRAUGHTSMAN required for a Design and Development Laboratory. Applicants must possess Higher National Certificate or equivalent qualifications, and have a practical experience of plastic moulds, small special purpose machinery, press tool work and general machine tool knowledge.—Apply, stating age, qualifications and experience, to The Employment Officer, Hoover Ltd., Perivale, Greenford, Middx. (F 382)

DRAUGHTSMAN. A vacancy occurs for a Senior DRAUGHTSMAN DESIGNER. Experience of light engineering practice essential and telecommunications experience an additional asset. Ability to develop original ideas, and evidence of previous successful pioneer work required.—Write, with full details of career and salaries earned to Personnel Manager, The Phoenix Telephone and Electric Works, Ltd., The Hyde, Hendon, N.W.9. (F 405)

URGENTLY REQUIRED

POWER STATION CHARGE ENGINEERS

by major oil company for service in the Middle East. Applicants must hold at least Higher National Certificate in Electrical Engineering and have had not less than three years' experience in the operation of large modern Steam Power Stations with thorough knowledge of the routine operation of water-tube boilers, turbo-alternators, E.H.T. switchgear and auxiliary plant. Present position in this country should be not less than Grade 8a, Class "H" or Grade 8, Class "G" on N.J.B. Scale. Age not over 35 years. Married accommodation available. Commencing salary not less than £900 per annum PLUS an allowance in the local currency which is liable to variation but which at the present time is equal to £1,400 per annum. Free passages out and home, free medical attention, kit allowance, good leave arrangements, excellent Pension Scheme. Write giving age, personal particulars and full details of qualifications and experience, quoting Dept. F.189, to

Box No. 2550 at 191 Gresham House, E.C.2

(E 284p)

CHIEF DESIGNER for high rupturing capacity fuses and fusegear. Intimate knowledge of fuses and fusegear and experience of high-power testing essential. University Degree preferred. Good salary and working conditions, including pension scheme and outstanding prospects for the right man. Applications, giving full details of age, qualifications and experience, to Box No. 1533, Electrical Times. (F 420)

DOMESTIC APPLIANCE DEVELOPMENT ENGINEERS are required by the English Electric Co., Ltd., Liverpool. Applicants should possess H.N.C. (Elect.) and have sound design or development experience of electric cookers, heating and motor-driven appliances.—Write, giving details of experience, quoting reference 452, to Central Personnel Services, English Electric Co., Ltd., 24-30 Gillingham Street, London S.W.1. (F 358)

DRAUGHTSMAN required by manufacturers of industrial electric cooking and heating equipment. Midlands, Age, experience and salary required. Box No. 1501, Electrical Times. (F 368)

DRAUGHTSMAN, O.N.C., age 22-23, used to detailing fractional horse power electric motors, required by well-known manufacturers.—Write in first instance, giving full details of experience, etc., to Croydon Engineering Co., Ltd., Commerce Way, Purley Way, Croydon, Surrey. (F 267)

EDITORIAL ASSISTANT required for monthly engineering journal by well-known London publishers of technical journals. Candidate must have sound general engineering knowledge, especially relating to electrical engineering, and experience of editorial routine work. The post offers good prospects of advancement and a superannuation scheme. Write stating age, previous experience and salary required to Box No. 1503, Electrical Times. (F 369)

ELECTRICAL BILLS OF MATERIAL CLERK, must be experienced in keeping records of electrical installation material and have working knowledge of electrical installation drawings and procedure. Apply by letter, stating salary required, experience, and when available to commence work, to: Chief Draughtsman, The Lummus Company Limited, 525 Oxford Street, London W.1. (F 423)

ELECTRICAL DRAUGHTSMAN required by major oil company for service in the Middle East. Must have served five years electrical engineering apprenticeship, and have had five years D.O. experience in connection with electrical layouts of large industrial plants with underground cable networks. Should possess Higher National Certificate. Graduate or associate membership of a corporate engineering body desirable but not essential. Maximum age limit 35 years. Attractive salary plus generous allowance in local currency. Free passages out and home, free medical attention, kit allowance, good leave arrangements. Pension scheme.—Write, giving personal particulars and details of qualifications and experience, quoting Dept. F.192, to Box No. 2809, at 191 Gresham House, Old Broad Street, E.C.2. Applicants without above requirements will not be considered. (F 322)

ELECTRICAL DRAUGHTSMEN for oil refinery work, experienced in wiring and installation layouts and taking off quantities. Should be capable of laying out small sub-stations and switch-houses. Knowledge of cable layouts and flame-proof conduit work desirable. Five-day week with paid overtime.—Apply by letter, stating age, experience, salary expected, and when free to commence work, to Chief Draughtsman, The Lummus Co., Ltd., 525 Oxford Street, London W.1. (F 357)

ELECTRICAL ENGINEER DRAUGHTSMAN, 24-30 years, Higher National Certificate, full apprenticeship, some d.o. experience, knowledge of motor and automatic switchgear applications an advantage. Modern office in West Midlands. Pension scheme, staff canteen. Write, with full details, salary and references, to Box No. 1531, Electrical Times. (F 419)

ELECTRICAL ENGINEERS required for service in Middle East. Applicants should (*a*) possess Ordinary or Higher National Certificate and have had full apprenticeship with heavy electrical equipment manufacturers or with a large colliery or allied fully electrified industry, or (*b*) possess a degree and have had two years' technical apprenticeship with similar firm to above. In each case applicants must have had at least three years' subsequent experience on the installation and maintenance of heavy electrical equipment. Maximum age limit 35 years. Attractive salary, plus generous allowance in local currency, free passages out and home, free medical attention, kit allowance, good leave arrangements, pension scheme.—Write, giving personal particulars and details of qualifications and experience, quoting Dept. F.191, to Box No. 2593, at 191 Gresham House, E.C.2. (E 415)

ELECTRICAL PLANT ENGINEER required for a shipyard and engine works on the north-east coast. Applicants should have served an electrical fitters apprenticeship in an electrical plant manufacturing works and should have had subsequent experience in the installing, maintaining and repairing of industrial a.c. and d.c. electrical plant, including switchgear, transformers, motors and control gear. Experience in the operation and maintenance of industrial mercury arc rectifiers and in organising an electrical maintenance staff will be an advantage. Apply in writing, giving age, experience and salary required.—Box No. 1521, Electrical Times. (F 414)

ESTIMATING AND APPLICATION DESIGN ENGINEER wanted for works near London to handle inquiries. Experience of motor control gear design essential.—State experience and salary required to Box No. 1517, Electrical Times. (F 402)

EXPERIENCED REPRESENTATIVE in London and the Home Counties required by fuse and switchgear manufacturers offering complete ranges of domestic and industrial fusegear, h.r.c. cartridges, circuit breakers and switchboards. Wholesalers' connection essential, but applicants experienced in cable and similar lines would be considered. Excellent opportunity for keen young man.—G. P. Dennis, Ltd., Fleming Road, Speke, Liverpool 19. (F 329)

FIRM in West London area require ELECTRICAL DRAUGHTSMAN with some experience of control panel layout and wiring. Replies confidential.—Box No. 1535, Electrical Times. (F 436)

FOREMAN wanted for electrical repair shop, accustomed to a.c., d.c., and static equipment up to 500 h.p. Must be able to handle mixed labour. Accommodation available.—Write, with full details, to Box No. 1497, Electrical Times. (F 353)

GENERAL ENGINEERING SUPERVISOR required, with ability to organise constructional programme and maintenance. Applicants should be competent in marking out for machining, general toolroom work, automatic mechanism construction, sheet metal and light structural work, welding, brazing, working of electrical insulation materials, electrical fitting, heat treatment and should have some knowledge of refractory materials.—Apply, Box No. 1537, Electrical Times. (F 437)

INTERESTING and progressive position exists for ELECTRICAL DESIGN DRAUGHTSMAN in rapidly expanding company. Experience on light, relay and electro-magnetic components would be an advantage.—Apply to Mr. G. T. Atkins, Electrical Engineer, British Messier, Ltd., Cheltenham Road East, Gloucester. (F 285)

LEADING manufacturer of electrical accessories, fittings, and domestic appliances has vacancies for REPRESENTATIVES, preferably with existing connections, calling on the electrical trade in London and the Eastern Counties Area. State salary required and previous experience.—Reply to Box No. 1515, Electrical Times. (F 401)

METER TESTER AND REPAIRER required by progressive London firm. Chance for ambitious man willing to work on own initiative.—Write particulars to Box No. 1527, Electrical Times. (F 417)

METER TESTER required by a well-established firm near London. Successful applicant must be capable of taking charge of section testing single-phase meters.—Write, giving past experience, age, and salary required, to Box No. 1495, Electrical Times. (F 352)

OVERHEAD-LINE ENGINEER required to represent consulting engineers on layout and site supervision of construction in the West Highlands of Scotland. Should have previous experience of wood pole construction. Graduate preferred. Apply, in writing, to Kennedy and Donkin, 32 Alva Street, Edinburgh 2. (F 422)

PLUMBER JOINTERS wanted for large contracts in Scotland and North England. Must be accustomed to voltages up to 11 kV. Out allowance and good rates paid to suitable applicants.—Apply, Miller and Stables, 6 Northumberland Street, Edinburgh. (F 424)

REPRESENTATIVE required by extensive electrical engineering concern for Nottingham area, covering products relating to the electricity supply industry. Qualifications: age 25-30 years approximately, with technical training to a minimum of National Certificate. Preference given to candidates with local knowledge and connections. Salary according to age, experience, and qualifications.—Apply, Box No. 1519, Electrical Times. (F 410)

SALES ENGINEER required to operate in the London area. Must have useful connections and practical experience in the sales and utilisation of moulded, resinoid and mica products. Salary £500 p.a., plus commission on sales effected. Applications, stating age, education, details of training and positions held to: Southern Areas Electric Corporation Ltd., 28 Queen Anne's Gate, Westminster, S.W.1. (F 425)

SALES MANAGER. Measurement, Ltd., Terminal House, Grosvenor Gardens, London S.W.1, require services experienced electricity meter engineer as Area Sales Manager in Scotland to supervise important existing contracts and develop business in meters and new electro-technical products. This post involves negotiations with B.E.A. executives of high technical calibre. In consequence applicant must possess excellent knowledge meter technology and basic electrical science in addition to resolute and well-balanced disposition. Engagement on period agreement at attractive remuneration, with expenses and car provided, also contributory pension scheme. Write fully and if possible enclose recent photograph (which will be returned). All applications to be addressed to chairman of company, will be treated as strictly confidential. (F 406)

SALES ENGINEER for photo-electric and electronic controls to operate from London office of well-known manufacturers. Good general experience of electrical and mechanical equipment is essential as is proved sales ability. Duties include handling of enquiries, new business and advising customers on the application of photo-electric control. Good progressive position assured to a capable and energetic young man, car owner preferred. Remuneration is by salary and expenses. Our staff know of this advertisement.—Full details in confidence to Box No. 1485, Electrical Times. (F 330)

SALES REPRESENTATIVES required in all areas for marketing an entirely new 5-amp switch of revolutionary design and phenomenal performance. Previous experience and sound established connections essential, particularly with Electricity Authorities, large contractors and Municipal Authorities. Good salary and commission plus car allowance. Write, stating age, experience, etc., and area thoroughly covered. Replies treated in strictest confidence.—Managing Director, Box No. 1469, Electrical Times. (F 287)

SANGAMO WESTON, LTD., have a vacancy in their INSTRUMENT SALES CORRESPONDENCE SECTION. Applicants should have a good general technical training, with some specialisation in electrical measuring apparatus. They should be capable of expressing themselves clearly and concisely both in conversation and correspondence.—Applications should be sent in strict confidence to the Employment Manager, Sangamo Weston, Ltd., Cambridge Road, Enfield, Middlesex. (F 200)

SHORT-CIRCUIT TEST ENGINEERS are required for the Nelson Research Laboratories of the English Electric Co., Ltd., Stafford. Applicants should possess a degree in electrical engineering and have experience of the operation and maintenance of heavy electrical plant. Duties will include the testing of heavy switchgear and applicants must be interested in development work.—Write, giving full details quoting reference 299C to: Central Personnel Services, English Electric Co., Ltd., 24-30 Gillingham Street, London S.W.1. (F 324)

SIX SENIOR DRAUGHTSMEN required by well-known Mechanical Engineers in London area. Must have sound technical engineering training and experience in the design of Boiler Mountings and auxiliary fittings. Five-day week. Pension Fund. Apply, stating age and full particulars of training, experience and salary required, to Box No. 1511, Electrical Times. (F 373)

TEST-ROOM PERSONNEL required for air-break switchgear and motor-control gear.—Apply, stating age, qualifications, experience and salary required, to The Wallacetown Engineering Co. Ltd., Viewfield Road, Ayr, Scotland. (F 426)

THE FORD MOTOR CO., LTD., has an immediate vacancy in their power house (present capacity equivalent to 70,000 kWs) for a MECHANICAL MAINTENANCE ENGINEER. Applicants should have extensive maintenance experience of modern high-pressure boilers, turbines, and auxiliary power-house plant. Membership of professional institution or equivalent qualifications essential. Commencing salary £750 per annum. Successful candidate will be appointed to the company's permanent staff, with appropriate pension rights.—Applications, giving full particulars, should be made to Ford Motor Co., Ltd., Salaried Personnel Department, Dagenham, Essex. (F 356)

WHOLESALE electrical company dealing in cables and industrial field requires GENERAL MANAGER able to expand business. Must be fully conversant with all phases of electrical trade, imports, and sales in home market and able to develop scope of company's activities. —Write, stating age, experience and salary required, to Managing Director, Box No. 1525, Electrical Times. (F 416)

SIMPLEX ELECTRIC CO., LTD.

OLDBURY, BIRMINGHAM

Applicants are invited for the appointment of Manager, South Wales area. Previous experience in the Electrical Industry in South Wales essential. Age preferably between 35-40 years.

Full details, experience, salary required, to:

The Secretary,
Simplex Electric Co., Ltd.,
Oldbury, Birmingham.

(F 399p)

APPOINTMENTS WANTED

APPLIANCE development. CHIEF ENGINEER (38), with experience of domestic and commercial cooking equipment, water heaters, small appliances, control mechanisms, and general light engineering, seeks new appointment. Many years in charge of technical departments. Good knowledge of production methods, patent procedure, Admiralty, Ministry, B.E.A., and export requirements.—Box No. 1493, Electrical Times. (F 351)

ELECTRICIAN (37), 20 years' experience, desires maintenance post with accommodation. Bungalow for sale to person wishing to retire whose post he could fill.—Box No. 1353, Electrical Times. (F 22)

WORK WANTED

CASTINGS, Fisher Foundries, Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (F 270)

A.C. and d.c. Motor Rewinds and Repairs. Prompt service fully guaranteed.—Edgware 8631 (4 lines). Service Electric Co., Ltd., Stanmore, Middx. (D 324)

ARMATURE ROTOR AND STATOR WINDING. We specialise in the repair and rewind of all types of electrical machines from fractional h.p. upwards. Special departments for vacuum cleaners, dryers, portable tools, etc. All work fully guaranteed.—Walter Crane, Greencoat Electrical Works, Westgate, Wakefield. Telephone 2172. (A 4)

ZEROS REFRIGERATORS.—Complete range of repair and service now available. Equipment reconditioned to conform to pre-war manufacturers' specifications.—Time Engineers, Refrigeration Specialists, 60 Southend Road, Rainham, Essex. Tel.: Rainham 2358; or Southern Area Agency. Tel.: Springpark 4217. Electrical Spares supplied to the trade. (A 639)

WANTED

A.C./D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Phone: Chiswick 5105. (A 20)

REQUIRED 130 b.h.p., 3 ph., 400 v., Ball Bearing Slip Ring MOTOR at 1,440 r.p.m., with starter. Particulars and price to Star Paper Mills, Ltd., Feniscowles, Lancs. (F 376)

SCRAP ACCUMULATOR PLATES and Sediment wanted, any quantities. Also Storage Batteries purchased and dismantled.—Phone or write Elton Levy Co., Ltd., St. Ermin's (West Side), Caxton Street, London S.W. Phone: WHitehall 9621-2-3. (A 3)

WANTED.—D.C. and a.c. ball-bearing MOTORS.—Full details to Britannia Manufacturing Co., Ltd., 22/26 Britannia Walk, London N.1. (A 13)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady St., Bethnal Green E.1. (A 1)

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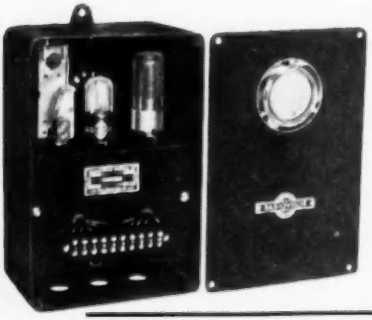

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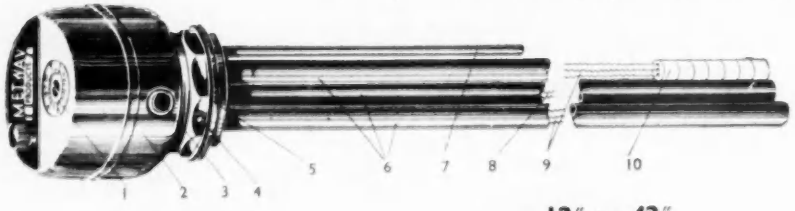

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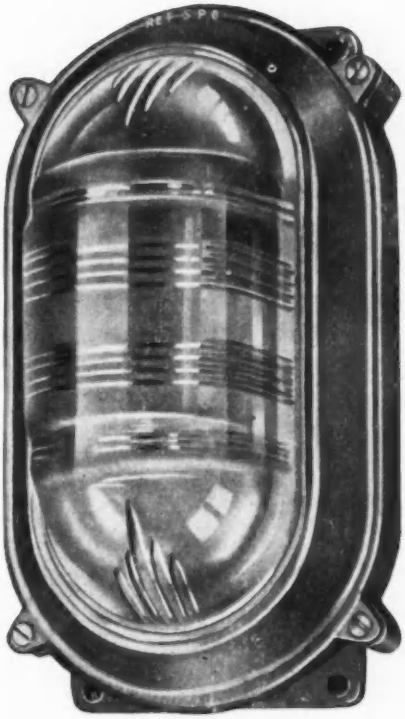

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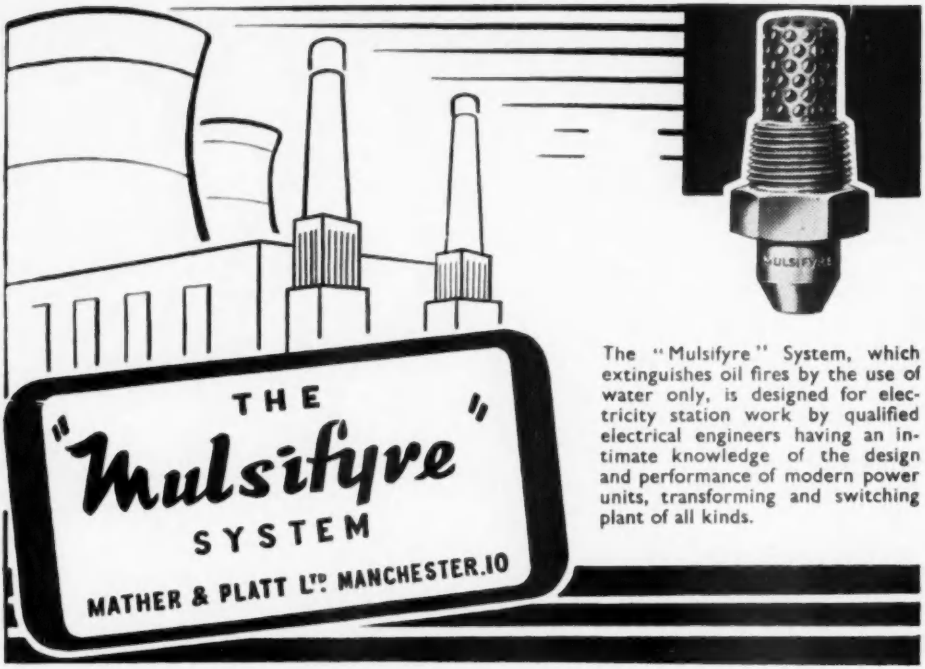

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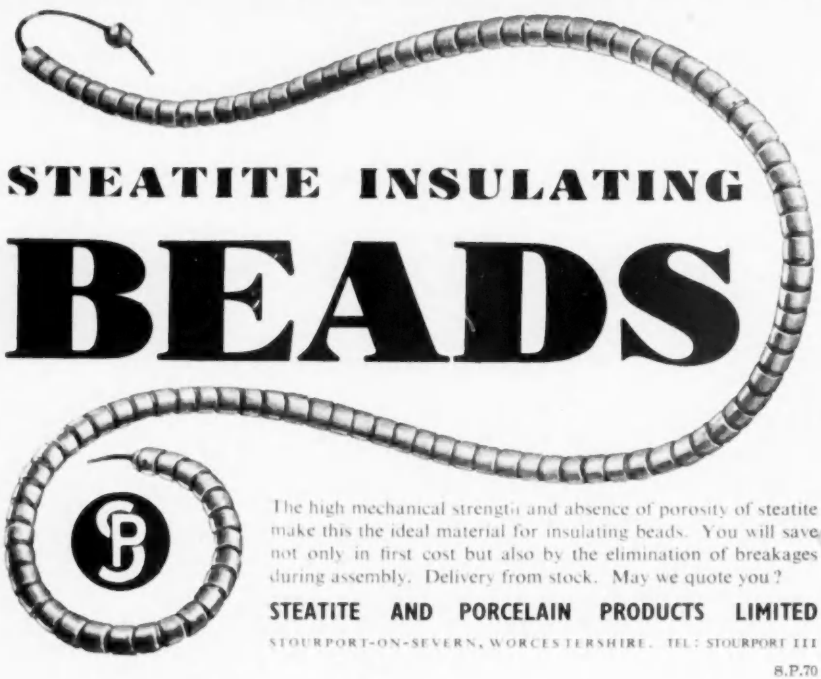

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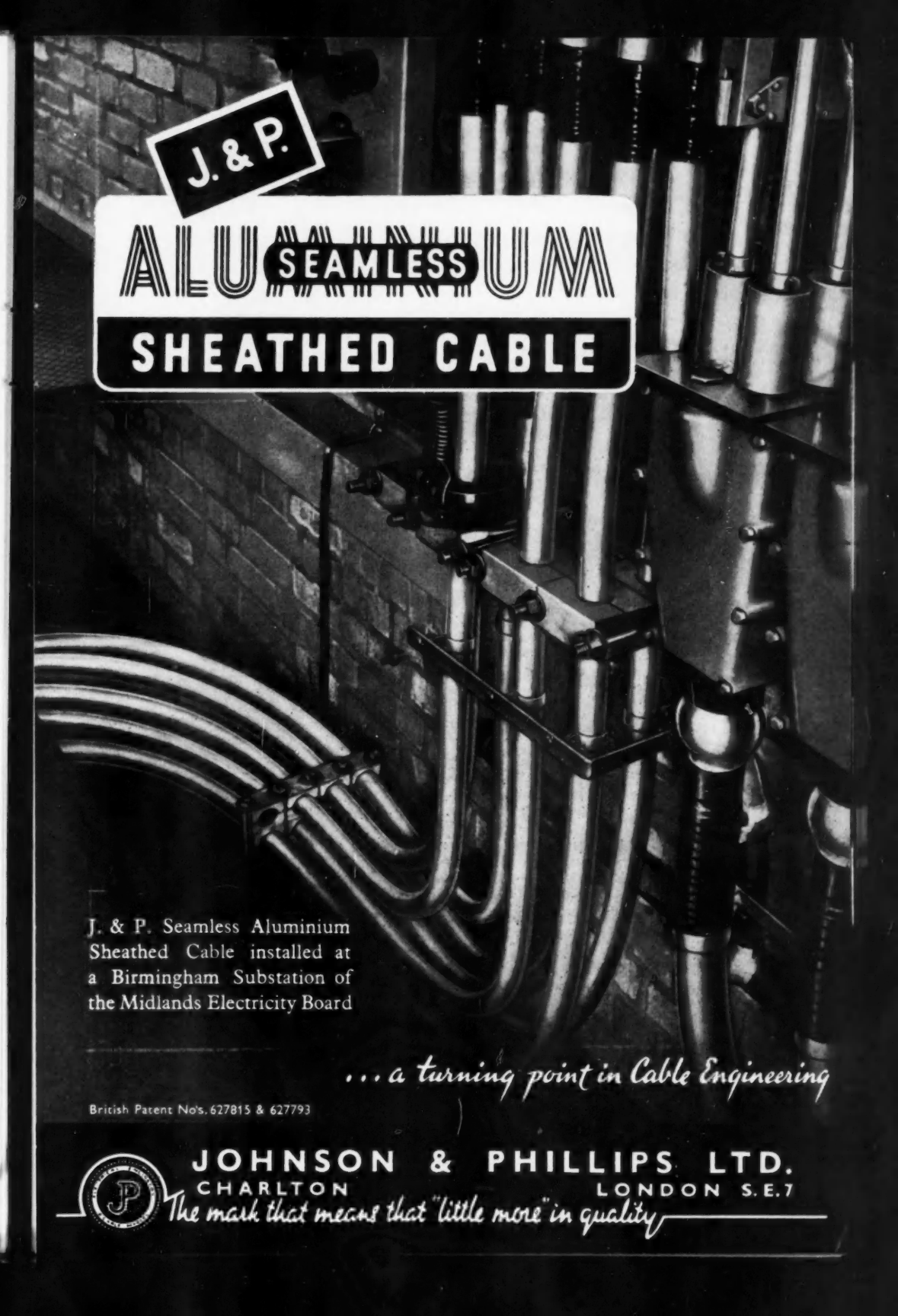

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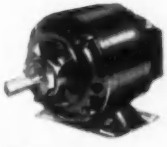

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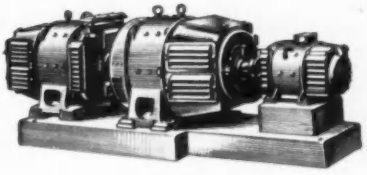

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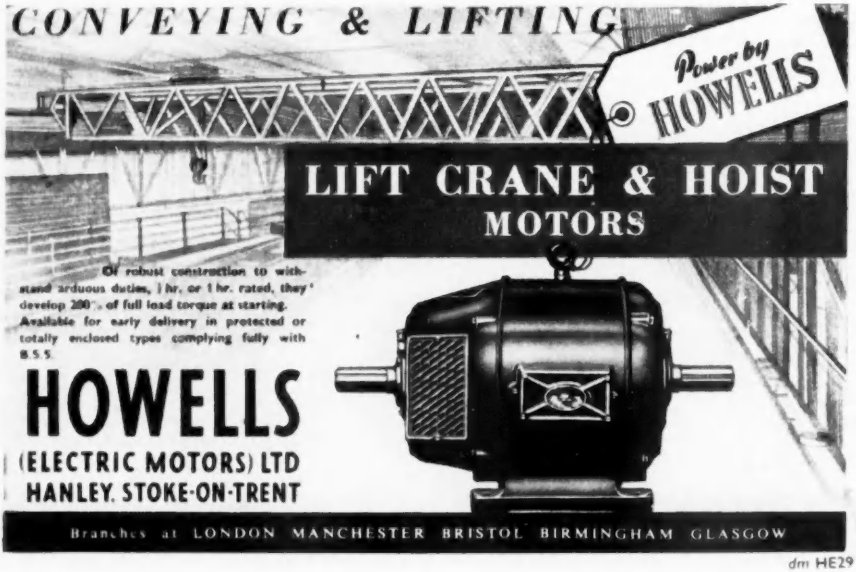
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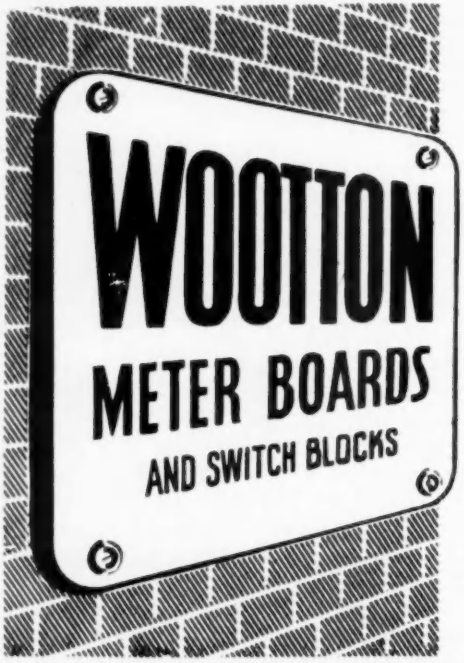

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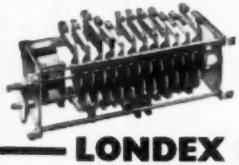

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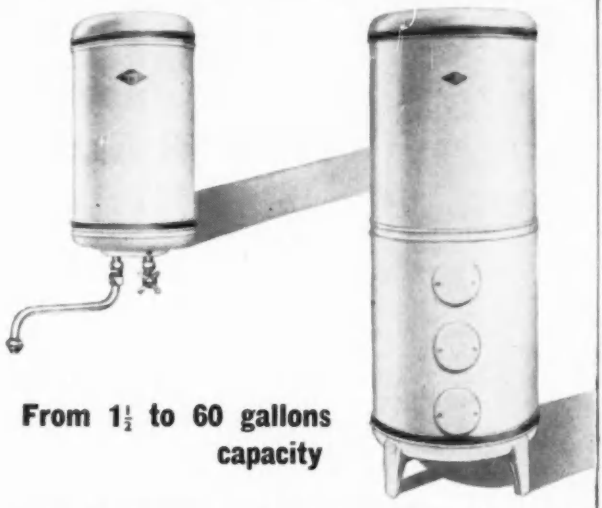

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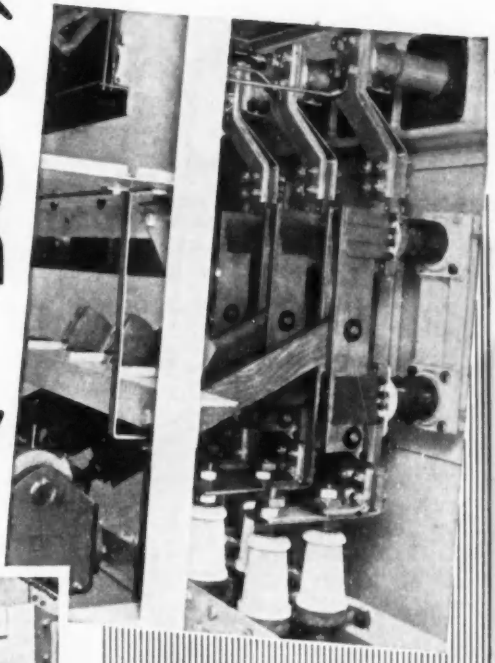

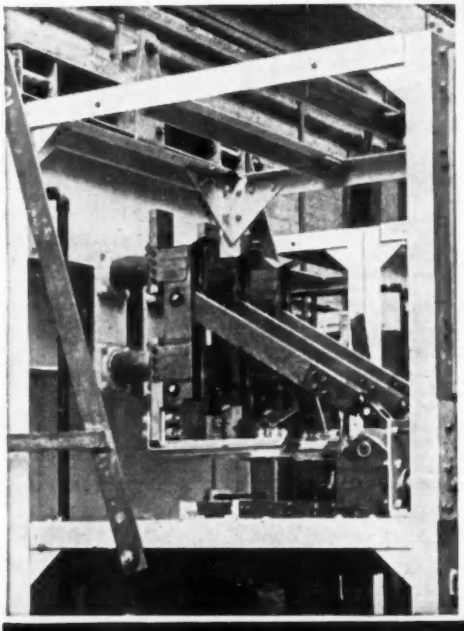

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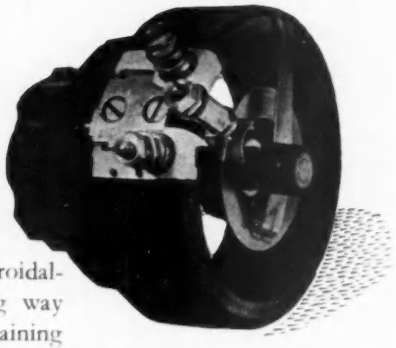

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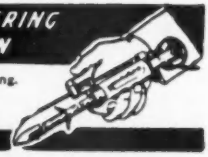

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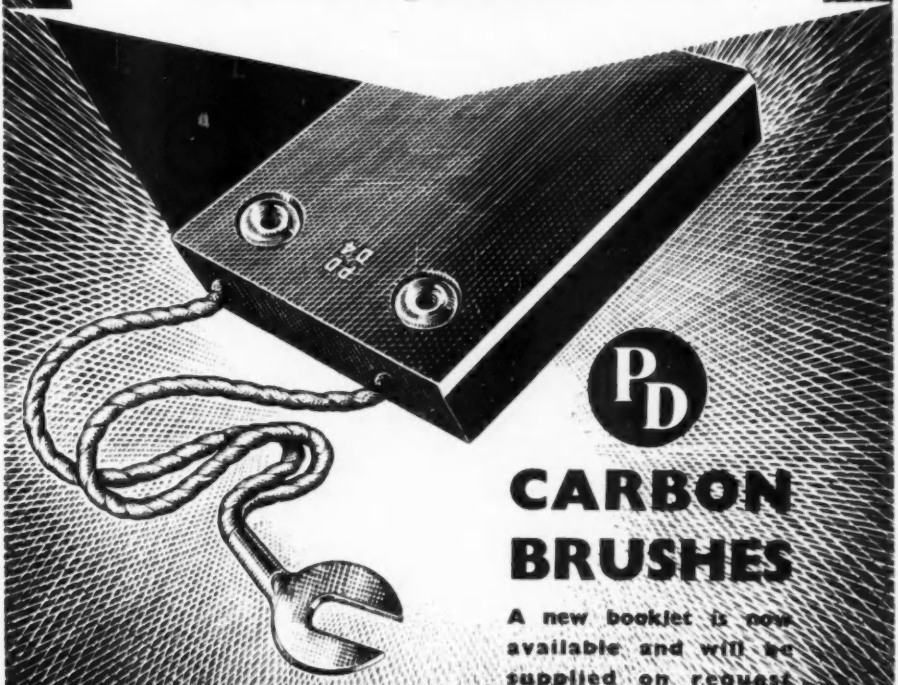

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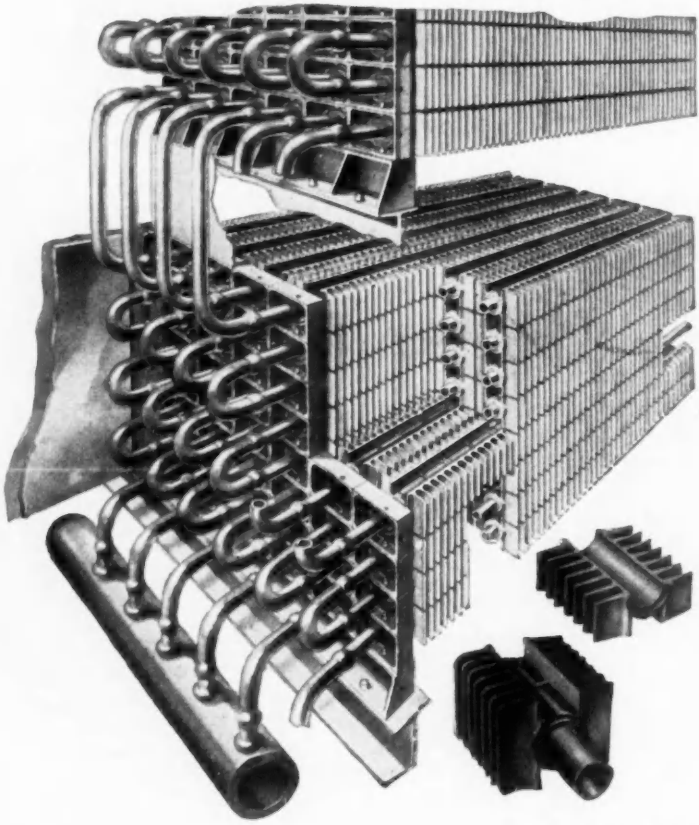

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Unit Type

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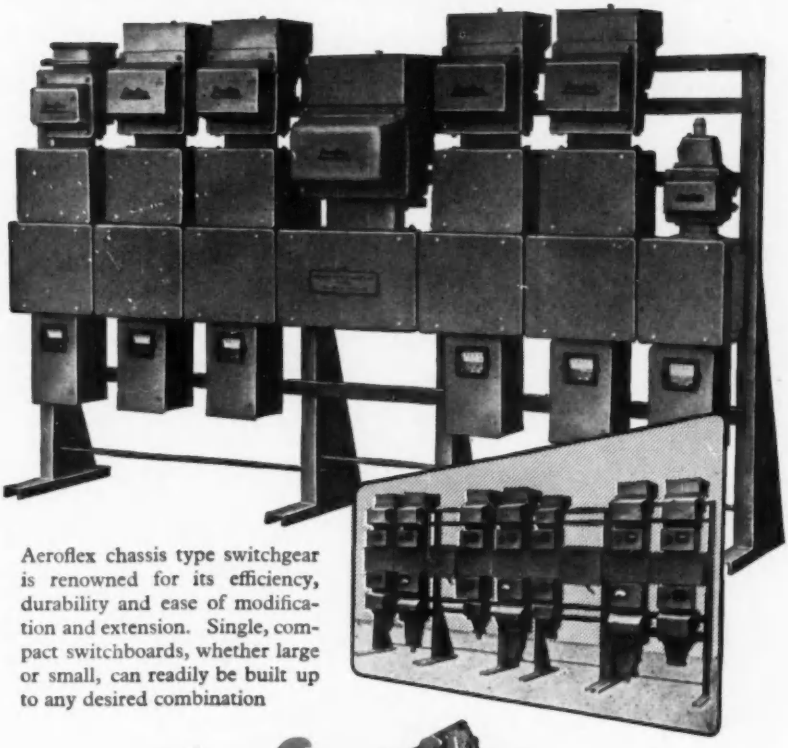

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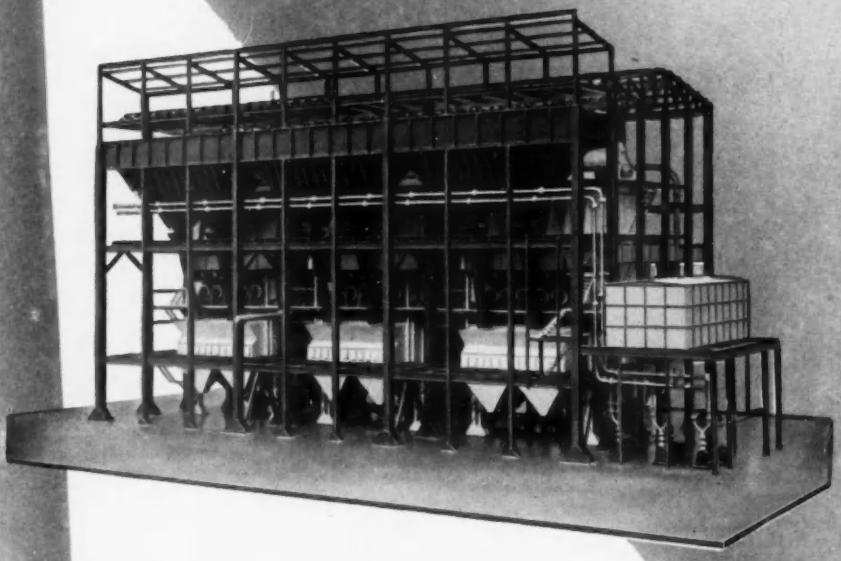

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